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EDITORIAL NOTES.

The Exhibition—and After.

THE National Gas Exhibition has had its appointed run; and on Saturday night it closed its doors upon the final day's large public attendance. To merely say that the exhibition has been a success in serving the quadruple objects of celebration, stimulation, demonstration, and attraction would be but a poor acknowledgment of all that it has been. It has, we sincerely believe, served more than the objects that the originators and organizers had in mind. It has been the centre of considerable life; and we are confident that it has done much in further quickening the pulsations of the industry's commercial being. We have therefore no hesitation in saying that it has been a magnificent success. The praise that has been showered upon the Chairman of the Executive Committee (Mr. F. W. Goodenough) and his coadjutors has been most richly deserved; and we would now and here place on printed record, for the guidance of whoever may in distant days be dealing with the history of the industry in these times, the fact that much credit is also the due of all those who rendered such effective service in the work of equipping the exhibition—from those in high places in the industry (we would specially mention Sir Corbet Woodall, the President, and the Directors and officers of both the Gaslight and Brentford Gas Companies), down to the fitters' mates, and subsequently the staff of trained attendants (we are particularly referring to the men) drawn from London and Provincial gas show-rooms, all of whom co-operated zealously and devotedly in making the display all that it has been. It will remain in memory a vast varied scene, illustrative of the work and service to the public of the gas industry outside its gas-manufacturing operations. The halls, the corridors, and the rooms, though dismantled, will continue impressed upon the minds of all who inspected them for their numerous lessons not only for the public, but for the masters and men of the gas industry itself; and the recollection of these halls, corridors, and rooms will long reawaken happy personal associations, through the attraction to them, and the meeting there, of gas men from all parts of the United Kingdom and abroad.

The patronage of the exhibition by the public has been great. The public got to know of the demonstration under its official style of the National Gas Exhibition; they soon came to regard it as the Rational Gas Exhibition. The co-operative display appealed to the majority of them; and the manner of illustrating actual uses in approximately correct settings, with all traces of the shop and order-canvassing removed, was very popular. It was all done by co-operation—co-operation that sought to arouse interest at the very foundation of the industry's prosperity. The prosperity of all engaged in the gas business begins in gas consumption, and the growth of gas consumption begets fresh demands for the appliances by which gas is used, and for the plant by which gas is produced and distributed. The visiting manufacturer has seen his opportunities in the way of power, heat, and lighting appliances that specially pertain to the factory. The shopkeeper has seen how best to illuminate and (when required) heat his shop The householder has seen how to light, heat, cook, and provide hot water in economical and labour-saving ways in the ideal home, and how to promote its hygienic conditions; and all this in manner to suit any purse from the rich man's down to the poor man's. The gardener has been shown how to heat his conservatories and greenhouses in the least laborious ways, and with the requisite temperatures under perfect control. Those who minister to human requirements, such as hotel proprietors and restaurateurs, have had typified the latest equipments for their kitchens, and have seen how to contribute by means of hot water and gas-fires to the comfort of their guests. Doctors have been shown how in hospitals and nursing homes, and other institutions, gas can assist in promoting maximum service and efficiency. Those engaged in educational work have had illustration as to how schools should be illuminated so as to safeguard the eyes of the children, and heated so as to obtain the most healthful conditions. Proper appliances for church lighting have also been shown. The proprietors of dining establishments have had illustrated how to light them economically and decoratively; the managements of large places of public assembly have been shown how the means of lighting may serve the equally important process of ventilation; and public lighting authorities have seen the units, large and small, that the gas industry offers for street illumination, and which units are the best possible light for obtaining efficiency in such a variable climate as ours.

All this and more the demonstration has accomplished. It has had an educative value in another direction among the public. We of the gas industry were too long content to adopt an unobtrusive policy, and, till quite recent times, the public really knew very little of our doings. The exhibition has capped the publicity work that has already been done; and it will make easier the work that must continue to be done. Very many thousands of people whose knowledge of gas affairs was bounded by their own methods of applying the primary product have, through the exhibition, had their horizon enlarged as to the ramifications of the business of the industry, and as to the enormous volume of business that is open to the industry to win—a volume that is daily on the increase through the growth of population and of manufacture and trade generally. All this is to the good. The gas industry wants to know, and to be known. The work, however, that the exhibition has done must be continued in the areas of gas undertakings. We believe that it will be, for the simple reason that the exhibition has had its stimulating effects where they were needed in the industry itself, as well as upon the public. No matter how good a gas manager or the head salesman may be in initiating fresh methods for advancing commercial interests, there is always the endorsement that must come from board or committee room before anything of a serious nature can be done; and endorsement of plans involving the spending of money is not always freely given by some boards and committees, and thus the introduction of new ideas is discouraged. The attendance of a very considerable number of gas administrators at the exhibition must have had a good effect in interesting them in the subject of the proper lines of demonstration, and in assisting to awaken in those who have been hanging back a desire for the adoption of a broader business policy. Of course no gas undertaking could afford to reproduce the National Gas Exhibition; but many gas undertakings could do much more than they are doing in rationally advertising their products.

Show-rooms in certain areas want to be made more attractive, and more demonstrative; and in some cases they badly need men in them who know their business, both technically and commercially, and are safe advisers, as well as salesmen. Let outside lights and gas-signs such as were seen at the exhibition draw attention to the show-rooms; and in regard to inside lighting, do let the show-rooms get away as far as possible from the old order of things. In lighting fittings, the gas industry has, in some supply areas, the unmerited reputation for being old-fashioned. It is true that what is suitable for Belgravia is not suitable for the East-end of London. But we do hope that all show-rooms will henceforth be (as many are) centres for the spread of the knowledge that the very best ornamental fittings and the latest methods in lighting are procurable with gas as the agent, as well as centres of educational effort in trying to raise the taste for a new order of things, in which higher artistic quality and fresh form shall be prominent. Prac-

ticability and fitness must, of course, ever come first; but who, having seen at the exhibition the beautiful gilt lacquered candle-brackets, with their delicate little light-screens, or the more obtrusive and ornate centre-pieces over the dining-tables, or the exquisite cut-glass shaded lights in the ceilings, or the beautiful semi-indirect fittings, will not find the ancient types that exist in some gas show-rooms perfectly repugnant to their taste? While not turning a blind eye on practicability, do let us work in cultivating, by demonstration, a higher level of demand in this matter. We say this very seriously; for everybody engaged in the work of the industry must be conscious of the fact that it has been through the mistaken belief that gas cannot offer the same æsthetic qualities as electric lighting that in many houses changes in the lighting agent have been effected. Our line of defence in the domestic lighting business is not in the cheapest and plainest that we can do, but in the antitheses in the sphere of decorative application. There is no need to advertise the plain forms of our lighting goods. They are sufficiently well known. Custom in this matter must be shunned; and the world everywhere must be shown that the application of gas can be made as ornamental as could be desired by the most dilettante. Not only are we in this way equipped for defence, but we have the further string to the bow, if we will only make use of it in attack, in that the quality of gaslight is superior in all respects to that of the competitor. These considerations are all apart from high-pressure gas lamps for both outside and large interior lighting.

There are still further lessons to be drawn from the exhibition for those gas suppliers who have not hitherto made the best of their position, and of the industry's modern appliances. There is the matter of the illumination and heating of public institutions. We should like to see more effort made in some areas in this direction. In dealing with the subject of misrepresentation and unfair play in connection with municipal trading in electricity, we have been absolutely staggered to find in these times such a large number of schools, workhouses, hospitals, churches, and other public institutions that are still lighted with flat-flame burners, and probably a few early specimens of neglected upright incandescent burners. Who can marvel that, under such circumstances, with their metallic filament lamps the electricians are able to come along, show a saving, and sing a loud song about it? We know that it is sometimes very difficult indeed to get the public authorities to consent to any change being made; but we are certain that much loss of custom in these places (where municipal control of the electricity supply is not the dominating factor) could be prevented by more enterprising action on the part of gas suppliers in demonstrating to the authorities what they stand to gain in both economy and efficiency by adopting the latest appliances of the gas industry. The exhibition showed sample forms of suitable lighting appliances for such places. We could go on multiplying the lessons that those who have not adopted the forward policy in the industry (our remarks, of course, are not addressed to those who have done so) could draw from the exhibition for bringing their commercial work up to date. The ranges of industrial appliances, cooking stoves for the large establishment, and the small cooking appliances for even the "girl bachelor," or the many types of gas-fires and water-heating appliances—must all have been suggestive to many visitors now identified in administrative capacity with the gas industry. One manager of a gas-works whose words have suggested some of the thoughts in this article told us that the bringing of his chairman and directors to the exhibition had done "a power of good," in inducing them to spend money in bringing the show-room up-to-date. There is another point. When one considers the high heat efficiency of the magnificent collection of heating appliances of all kinds that were to be seen at the exhibition, it must be at once apparent that no great further progress can be possible in advancing this efficiency, and that to obtain the full measure of adoption, British thermal units will in future have to be dispensed by the gas industry at the lowest possible rate.

In pointing to the inspiring value of the exhibition for not a few quarters in the industry itself (quite apart from the primary objects of the display), we do not by any means say it was perfection unalloyed. It would have been almost a supernatural happening if it had been, in view of its size; but reasonable beings can afford to overlook the small defects in the largeness of the mass of that which was excellent, and the enormous good that the show has done, is doing, and will continue to do far ahead. There may possibly be among us some critics who, with a very high estimate of their own personal ability—higher perhaps than other people would award—believe they could have made a much better "job" of the vast creation. Should there be any such, their constructive assistance would, it may be, have been useful at the beginning of the exhibition. But now that it is at an end, fault-finding on details would be altogether out of place, and would savour very much of an act of spite against those who have, with self-sacrificing devotion, borne the grind and labour day and almost night for months in working for a notable accomplishment. But should there be any men in the industry who have suggestions to offer now, they will find for themselves proper place and time without taking any cowardly course—any course that would be unworthy of a Britisher and a gentleman, or any course that is not in the best interests of the industry. When consideration is invited to the organization of the next exhibition, the experience on this occasion will be very serviceable in promoting still greater perfection. As it is, never has there been an exhibition that has been more popular than this one, nor one more attractive; nor has there ever been a month in the history of the gas industry that has been so full of life and interest as the one that has just closed. Therein lies a rich reward.

Special Circumstances.

THE members of the Manchester Institution, accompanied by their President (Mr. J. C. Belton), had a very instructive and pleasurable visit to Barnsley on Saturday last, chiefly due to the courtesy and very generous hospitality of the Directors of the Old Silkstone Collieries, Limited. It has sometimes been hinted that the owners of bye-product coke-oven plants are conservative and inclined to be exclusive; but we have not experienced these attributes. As a matter of fact, we have several agreeable recollections of the inspection, in company with gas engineers, of some of the best recovery plants in the country—the inspections being unrestrained, and the information afforded copious. The inspection of the Barugh plant of the Old Silkstone Collieries on Saturday was no exception to previous experiences; and it showed once again that the interests of gas-works and of coke-oven recovery plants are drifting into a common road.

The only paper read at the meeting held during the visit was by Mr. F. D. Richmond, of Heckmondwike; and it was on the subject of caring for the consumer. It is a modest paper; but it is eloquent in its lessons. Here is a manager in a district unfavoured with any of the conditions obtaining in most residential and industrial areas by which new lines of gas business can be developed, who has, in face of keen electrical competition, rescued the concern, during the nine years of his management, from a state that his description suggests was one of utter chaos, and has added some 20 million cubic feet to the business simply by looking after the consumers, and maintaining their satisfaction—in fact, practically every household in this mining area is now supplied with gas for some purpose or other. The paper serves appropriately as an illustration of a point made on more than one occasion during the proceedings at the meeting of the British Commercial Gas Association, that the circumstances and the people of gas-supply areas vary so considerably that the methods applied in the work of developing business cannot by any means be standardized for universal application. In Heckmondwike quite 80 per cent. of the houses are occupied by working men; and coal is cheap, because close at hand. The price of gas is only 2s. 6d.; but, under the local circumstances, the 80 per cent. of householders are not good customers for gas for cooking and heating. As a matter of fact, most of them have no room in their houses for a cooker. Mr. Richmond, early appreciating that his conditions were not those of most other gas men, set to work to make the best of them. This he did by entering upon a systematic scheme of "caring for "the consumers;" and this has had the beneficial effects already mentioned. He gives attention to every one of his consumers. His manner of doing this must be gathered from the paper. He finds that systematic work among the gas consumers is the best possible advertisement; and this nobody can deny.

A point is made by Mr. Richmond which goes to confirm one made by Mr. H. Townsend, when discussing Mr. A. E. Broadberry's paper at the meeting of the British Commercial Gas Association. There is not much room in areas

such as Wakefield and Heckmondwike for such things as water-circulators—properly fitted geysers are better; but the most popular thing for water heating in the houses of the workers in these areas is the wash boiler. Both Mr. Townsend and Mr. Richmond invite the makers of these boilers to consider the question of the provision of a movable bath in connection with them, together with some means of removing the hot water without having to bale it all out, and also without a draw-off tap which would be a source of danger to children. There is a new problem here for the makers of gas-heating appliances; and there is business in it as reward for successfully meeting the requirement.

Payment for the Defence of Rights.

READING the report of the Committee of the Gas Companies' Protection Association, the speech of the Chairman (Mr. H. E. Jones), and the proceedings generally at the annual meeting last Thursday, there is found plenty of satisfaction in the shape of evidence as to the utility of the Association. But, because the Association exists for protection, there is no occasion whatever that it should bear a disproportionate part of the financial burden of doing work that is to the advantage of the whole industry. In one way it is unfortunate that the benefit of much of the work that is done for the members cannot be restricted to them, and not be allowed to flow over into all non-subscribing quarters of the industry. There are 119 gas companies represented in the membership of the Association; but there are no less than 520 statutory gas companies in the United Kingdom, and 302 statutory local authority undertakings (to say nothing of non-statutory gas concerns, company and otherwise), all of which largely benefit from the work undertaken by the Association. The 119 subscribing companies, however, are usually left to bear the expense of what is done. They have been left to discharge the major part of the liability resulting from the contest regarding the residuals restriction question. The Association took up this matter, and stood in the forefront of the fight with the chemical manufacturers. Had this assault on the industry not been persistently resisted right at the beginning of the imposition of the mischievous restriction, the whole industry in time would unquestionably have been deprived of the right of complete free trading in a large proportion of its residuals, to the benefit of the chemical manufacturers, who fought hard to obtain a stronger controlling position, and at first made substantial headway.

What are the results of the interposition of the Association? The first is that the gas industry (excepting some two dozen undertakings with the restriction in their Acts or Provisional Orders) has been freed from, and protected against, the infliction of the restriction; and the second is that the Gas Companies' Protection Association are left with a burden of upwards of £412 upon their shoulders over and above the sum that they voted in the first instance towards meeting the costs of the contest. The sum the Committee allocated for the purpose was £400; the Institution of Gas Engineers contributed £400; and the Association of Municipal Corporations voted £500. So that, unless they are relieved of the undischarged burden of £412 odd, the Gas Companies' Protection Association will not only have borne the brunt of the fight, but will have been run into the heavy expenditure of over £812 for having done so, and producing relief for such a large proportion of the gas undertakings of the country from further trouble in this respect. The £412 is surely an obligation resting on those numerous gas undertakings that are not members either of the Gas Companies' Protection Association or of the Association of Municipal Corporations. We hope the gas undertakings that have had no financial part, directly or indirectly, in this matter will take the hint. If the Association are to be left to bear such a weight of financial burden as the result of their protective work, then it will be a discouragement to their activity, except when the interests of their own members imperatively call for it. The Chairman referred to the matter in his speech at the meeting. He might well have spoken strongly on the subject of the relation of non-payment to material benefit; but he did not. He wants to recoup the £412 deficiency. The Association are entitled to believe that they will not be left with such a sum hanging upon them undischarged by gas undertakings who have not contributed one penny to the work that had to be undertaken so as to completely cancel the residuals restriction. We hope the next reference the Chairman makes to the matter will take the form of an announcement that there has been a ready response to his appeal.

The Model Clauses and Residual Products.

LAST year there was a little protest against the Private Bill Authorities altering the model general purposes clause, and inserting in it the words "by them," so as to restrict the working-up and dealings in residual products to those resulting from their individual gas-manufacturing operations. The change was made in the model clauses despite the fact that Parliament had appointed a Joint Committee to consider whether or not it was politic to restrict the operations of gas undertakings in this regard; and the result of the inquiry proved that the insertion of the words was premature and a mistake. In the newly-issued model clauses, the two restricting words "by them" have been deleted, but otherwise the alteration has been maintained. It now simply enacts that the company or local authority "may convert, manufacture, and sell all residual products "resulting from the manufacture of gas." We would suggest that, after the decision of the Joint Committee, this clause as it stands is not fair, nor is it sufficiently broad in its terms to give effect to the decision. It merely and specifically provides for conversion, manufacture, and sale of residual products. It does not say anything about purchasing or dealing in residual products. Compare the provisions with the wide ones of the clause as it appeared prior to the first attack of the chemical manufacturers. The terms then were: "May provide, purchase, sell, dispose of, "and deal in gas, coke, tar, and all other residual products "resulting from the manufacture of gas." We do think that, in view of the finding of the Joint Committee of the two Houses of Parliament, gas undertakings have a right to the insertion in the clause of the words "purchase" and "deal in." There ought not to be satisfaction with anything less than a clause that expressly allows of free dealings, so that there is no outside control of the markets that would be of detriment to the gas industry and to the gas-consuming public. As the model clause stands, it may give rise to much unpleasantness which may be avoided by proper representation being now made; and we think the Parliamentary Authorities will see the justice of the claim, in view of the result of the inquiry. Anyway, in any promotions for next session in which the general purposes clause appears, both words, "purchase" and "deal in," should be included. The mere exclusion from the altered clause of the words "by them" does not seem to us to go far enough.

Nuisance and Damage by Gas-works.

COMPLAINTS of nuisance from gas-works which reach the Law Courts are of such rare occurrence that, when a case is brought to notice, it claims serious attention. The action of "*Wood v. The Mayor and Corporation of Conway*," which occupied a large part of the sittings in Mr. Justice Joyce's Court during seven days—a much longer time than it seems to us was necessary to try a comparatively simple issue—has ended in the defendants having to pay the costs of the protracted hearing, and 40s. damages. The allegation was that the emanations from the gas-works were such as to be a nuisance to the plaintiff, and to occasion injury to his trees, and thus affect the amenities of his occupation of dwelling-house and lands. The evidence was conflicting upon every point; and, though his Lordship's decision was opposed to the defendants, a careful consideration of the evidence does not convince us that in any respect the gas-works at Conway are conducted with any greater nuisance than is, practically speaking, inseparable from a coal carbonization process, unless the process is conducted on the continuous vertical retort system. A certain proportion of smoke and steam there is bound to be from a gas-works in charging the retorts and in quenching the coke where any but the continuous vertical system is used; and the very presence of a chimney suggests that something must come from it in the way of products of combustion. But gas-works chimneys are far from being the sinners in regard to their emissions that the chimney stacks are of most other factories.

The fact of the matter is that this question of gas-works nuisance ought to be looked at from the point of view as to what is not unreasonable in the conduct of such a manufacturing process as gas production. About such a process, a certain amount of smell within a limited area—not a considerable amount of smell—is certain to be present. But careful working can, of course, mitigate its unpleasantness. This is a point that must be known to anyone who has been in the neighbourhood of a gas-works; and when, as Mr. Wood did, anyone purchases a residential property with

gas-works as a neighbour, he ought surely to know that, accompanying such a manufacturing process, there is sure to be a moderate amount of escaping steam, accompanied by smell. The evidence as to the damage to Mr. Wood's trees was not very precise. Many gas-works have quite a luxuriant horticultural environment, with no sign of detrimental effect through the presence of the works. There is no denying that some of the trees in the neighbourhood of the Conway works were somewhat bald upon their heads, but there was testimony that the same thing could be seen in other parts of Wales. In the chemical evidence, we try to trace corroboration of the allegation that the deterioration of the trees was due to some chemical effect; but there again is failure. On the one side, we have Mr. William Thompson asserting that the damage was occasioned by sulphur dioxide; but, on the other hand, Dr. Harold G. Colman's analytical investigation assured him that the leaves of trees in a region of Surrey undefiled by the presence of factories of any description contained double the quantity of sulphurous acid found in or on the leaves of the trees in Mr. Wood's garden. We are not therefore convinced that there are any more emanations from the operations carried on at the Conway Gas-Works than from any other normally conducted gas-works. The trouble, such as it is, really seems to be due to the closeness of the scene of the quenching of the coke and the charging of the retorts to the property of the plaintiff; and something has now to be done to prevent the continuance of the little offensiveness (practically inseparable from the ordinary system of carbonizing operations) from which Mr. Wood desires relief. An injunction has been granted; but it has been suspended until June 30 next. How the Corporation are to comply with the commands of the Court without considerable sacrifice remains to be seen.

Although we do not admit—drawing conclusions from the evidence only—that the Conway works are run with any more nuisance in the matter of steam and smell than other works similarly operated, we cannot altogether absolve the Corporation from blame in the matter of the trouble that has come upon them. The grievance is a long-standing one. Mr. Thomas Newbigging several years ago advised a new site for the works. Instead of taking this counsel, when increased retort power was required, the carbonizing operations were only shifted from the opposite side of the works from plaintiff's property to a site abutting on to it. This seems to have been the fatal mistake. The plaintiff, however, offered £1000 towards any expense incurred in completely freeing him from what he regards as an objection. This £1000 *plus* the costs incurred in litigation would have gone a long way towards efficient remedial measures. As it is, the work (whatever its nature) has still to be done; and, so far as we can see, with the winter's work before the undertaking, the period between now and June 30 is not any too long in which to do it.

To Non-Subscribers to the Exhibition Funds.

The National Gas Exhibition having ended, and the national demonstration having been successfully made, the next thing is the consideration of the balance-sheet. During the exhibition, notwithstanding the remarkable attendances, there has not been a single accident. The guardians of the public (the London County Council), however, insisted on some heavy expenditure in connection with the buildings—expenditure that was not anticipated; and this helped very substantially to produce a financial balance on the wrong side. As the result of a consultation between Sir Corbet Woodall (the President of the Exhibition), Mr. Edward Allen (the President of the Institution of Gas Engineers), Professor Harold B. Dixon (the President of the Society of British Gas Industries), and Mr. F. W. Goodenough (the Chairman of the Exhibition Executive Committee), it has been decided to address a letter to all non-subscribing gas undertakings, asking whether, in view of the national character of the exhibition, as shown by the Press notices all over the country, they will not now mark their approval of the effort and their desire to be among the supporters, by including their names in the list of subscribers. An early reply to this appeal is much desired. We hope the response will be such that the organizers will be immediately relieved of all anxiety in regard to the deficiency, which is an industrial liability. No gas undertaking ought to withhold support from such a beneficial work as the exhibition has proved to be.

The Manchester Institution Meeting.

Saturday's meeting of the Institution was favoured by excellent weather; and the large number of members who assembled from all parts of the extensive district spent an instructive and enjoyable day together. The arrangements were excellent at the coking works of the Old Silkstone Collieries, Limited, whose representatives are to be congratulated on the thorough way in which they were able to conduct the parties round and explain all the working. At present, it seems, there is complete harmony between gas-works and coal-owners, as far as their coke working is concerned, though one or two thrusts were made about coal prices—of course in friendly spirit on this occasion. But, though the interests of gas makers and coal owners have undoubtedly much in common, there was also much truth in some words jocularly spoken by one of the gas men, that the coke-ovens are to a large extent rivals of the gas industry. They produce a good coke at a cheap rate; they cut prices in the sulphate of ammonia market; and, moreover, they supply cheap gas, which enables the electric people to generate current cheaply. But coke-ovens have much that they can learn from gas-works; and gas-works are now installing so much coke-oven plant, that it is sincerely to be hoped the friendly relations will continue.

The Business of the Day.

The Institution found ample accommodation for their business meeting in the Miners' Hall; and incidentally it may be mentioned that miners evidently appreciate comfortable chairs! The formal business of the day was transacted with exemplary rapidity, and Mr. Richmond's paper was of the right kind, in that it was short, and lent itself to discussion, and the relating of useful experiences from other places of different sizes and natures. It was a little strange, however, to hear a member of the Manchester Institution, who pride themselves above all on being enterprising and up-to-date, declaring that the gas lighting business was practically at a standstill, and that the industry must look to other sources for the sale of gas. It was very satisfactory to hear the almost general cry of "No, no" with which this remark was met. Let the industry by all means push the other applications of gas; but surely there are few who consider that gas lighting is "singing its swan song." It seems more than probable that, with its lungs inflated at high pressure, the industry will sing this song for many years to come. Unfortunately, the presidential bell had to cut short the discussion, though it had a very fair run. Even then the members were only just punctual for an excellent dinner in the town, by which the Colliery Company added the finishing touch to their hospitality.

Municipal Duties.

Some two hours were spent by members of the Bradford City Council recently in the discussion of a proposal which, if it had been adopted, would have added one more to the many branches of work carried out on behalf of the ratepayers. But it was not carried. In fact, it was defeated by a very large majority. We have noted at previous times suggestions made at Bradford that the Corporation should become the possessors of a colliery; but on the present occasion nothing of this importance was proposed. The idea was merely that the Gas Committee should be instructed to spend £5000 out of the trading profits of the undertaking legally applicable to the purpose, for the purchase of coal suitable for re-sale in small quantities to householders, at prices which would refund the cost, with interest on the capital outlay. The object of the mover of the resolution was a laudable one; for the hardship, especially to the poor, of the high price of coal is obvious. What, however, was questioned was the ability of the Corporation to buy at a cheaper rate than the ordinary coal merchant. If they could not do so, there would, of course, be no object in thus annexing the gas profits, competing with traders, and adding to the work of the officials. In any case, there must be a speculative risk attaching to the purchase of a quantity of coal for selling in small lots; and considering the many important duties that demand performance by local governing bodies, it is difficult to quarrel with the determination of the Bradford councillors not to increase their "sphere of usefulness" in the direction indicated. During the debate reference was made to the fact that the October meeting of the Council is generally an electioneering meeting; but there is no need to adopt this as an explanation of the proposal.

THE NATIONAL GAS EXHIBITION.

INTERNATIONAL EXHIBITIONS HALLS, SHEPHERD'S BUSH.

Organized by the Leading Gas Companies and Corporation Gas Committees of the United Kingdom and the Society of British Gas Industries.

President - SIR CORBET WOODALL, D.Sc., M.Inst.C.E.

NOTES FROM THE EXHIBITION.

Lost opportunities—The days of the exhibition during which anyone connected with the gas industry did not visit it.

The exhibition is now being dismantled. The work commenced well before midnight on Saturday. The exhibition took more than a month to bring together. Only eight days are to be allowed for disbanding it.

During the first four days of the past week, the number of visitors passing the exhibition turnstiles exceeded that of the corresponding days of the previous week by about 50 per cent.

The Lord Mayor of London (Sir David Burnett, Bart.) and the Lady Mayoress had an excellent reception at the exhibition, when, in semi-state, they visited it on Friday for the purpose of the prize distribution in connection with the cookery competitions. The prizes were distributed by the Lady Mayoress; and, as will be seen, Sir David, and Sir Corbet Woodall, Mr. Edward Allen (the President of the Institution), and Mr. D. Milne Watson made happy speeches. The Lord Mayor and Lady Mayoress were obviously very pleased with the reception; and the girls and boys especially were delighted to have before them a real live Lord Mayor, and to have the pleasure of shaking hands with the Lady Mayoress. Miss Helen Edden, who has been chief supervisor of the work in the cookery theatre, was gratified with this the crowning success in a continuous success.

Immediately outside the exhibition, in the early part of the evening, Uxbridge Road was lined with patiently waiting people to see the popular Lord Mayor and Lady Mayoress leave the exhibition after the prize-giving. There was quite a little outburst of enthusiasm outside as Sir Corbet, Mr. Milne Watson, Mr. Goodenough, and Mr. Thornton bade good-bye to his Lordship and her Ladyship, and as they drove away. The positions of the Lord Mayor and Lady Mayoress of London—besides duties heavy and far-reaching—have their opportunities and pleasures, and a large human side in their work. We have seen something of this side during the exhibition.

Friday was a very busy day. There was a presentation to Mr. F. W. Goodenough. He has been the giant of the show; and he has done a giant's work in connection with it. But he modestly disclaims that he has done any more than the position in which he has been placed demanded from him. But the position in which he has been placed was only obtained by personal ability and energy; and it is this ability and energy that have been seen throughout the exhibition. He has also had to show himself strong enough to withstand a few pin-pricks, and even the stab of the concealed hand. But the praise of the majority, the almost general recognition that he did his best (and his best was great in result) under the circumstances of a novel scheme, form together an effective palladium. The experiences obtained in the exhibition will serve well when required.

We met Mr. J. T. Lewis, of Wellingborough, the other day. He was enthusiastic in his praise of the exhibition for the purpose it was intended to serve. He seems to have taken good advantage of the show. His Chairman and Directors came up, and on two or three occasions he brought along other parties from Wellingborough. All were delighted.

At Dr. C. W. Saleeby's lecture on Friday night, Mr. E. A. Harman, of Huddersfield, presided, being *locum tenens* to his Chairman (Alderman W. H. Jessop), who was busy with the municipal elections. What Mr. Harman said on the occasion about discounts and prepayment consumers is worth reading. A report will be found on another page.

The speech by Mr. Charles Carpenter, D.Sc., at the luncheon given by the Metropolitan Gas Companies to the members of the British Commercial Gas Association last Wednesday week (*ante*, p. 342), made an excellent impression, and there is already talk as to what, if anything, will be done to give gas good representation at the White City next year.

Mr. G. Bernard Shaw is a busy man, and has no time for odd jobs. Mrs. Cloudesley Brereton, in her capacity as Chairman of the Editorial Committee of the Exhibition, ventured to invite G. B. S. to take the chair at one of the conferences. She called attention to the fact that noble lords were taking the chair at various conferences on the social and economic aspects of the industry; and therefore it was fitting that "Socialist London" should be represented. A post-card reply ran: "I cannot be of any use to you in the way you suggest. Odd jobs of this sort are out of the question for me; it is with great difficulty that I can manage to keep up my regular activities in the way of public meetings."

It was a kindly thought on the part of Mrs. Cloudesley Brereton to invite to an informal dinner, on the eve of the closing, members of the Press who had been closely identified with the proceedings at the congress and exhibition. The party which assembled in the restaurant was not a large one; but the evening was none the less pleasant on this account. In fact, the dinner was a perfect one from the pressman's point of view—there were no speeches! Only one thing there was which the guests regretted, and this was that their hostess had to leave them before the end, in order to be present at the dinner which the President was giving to some friends in another part of the exhibition. Even in this misfortune, however, there existed the mitigating circumstance that there was another lady—a professional "brother"—present, so that the finish of the dinner was not without grace.

In speaking of this dinner, a word may be said of the publicity work in connection with the exhibition—a branch of work of which the magnitude certainly (if not the importance) is sometimes not fully appreciated by those who have had no experience of it. It was tackled in a very thorough manner at Shepherd's Bush. The press-rooms were placed in charge of a staff of journalists competent and experienced in newspaper work, and therefore able to exercise judgment as to the requirements of the general public; while press representatives visiting the exhibition must have found their task much lightened by the facilities offered them in the performance of it. The wide notice which the exhibition has secured—and deservedly so—in the newspapers is testified to by several large books of cuttings collected by the editorial department. No doubt, it is now as impossible as it ever was to "make bricks without straw." But in this case the press staff had plenty of "straw," in the shape of good matter, and some big "bricks" have resulted.

"R. W. E." writes: The great exhibition has passed; and to the last moment the public filled it with great crowds of interested spectators and listeners. Those who realize the true object aimed at, firmly believe that wide and lasting benefits to consumers and ourselves will follow. Let us, therefore, not waste time in airing fads and fancies as to what was or was not embraced in the magnificent efforts of that hard-working body of earnest men, but look at the whole with that broad view of the man in the street (who was well catered for) and fit to our eyes the spectacles of the public, who we know from repeated testimonies have very thoroughly appreciated our exhibition as a true effort for their interest and our own. To those responsible for the production of this splendid exhibition, we tender our sincere congratulations, with "Thanks! Thanks!! Thanks!!!" We onlookers have been proud of the whole scheme, and only hope that some day another opportunity will be given to "us to pass that way again."

THE EXECUTIVE AND RECEPTION COMMITTEES

Entertained at Dinner by the President.

It was a thoughtful act of the President of the Exhibition (Sir Corbet Woodall, D.Sc.) to gather round him, at a private dinner at the exhibition on the eve of its closing, those who had been the chief workers in connection with it. It was a small party—numbering, with probably not more than half-a-dozen personal friends of Sir Corbet, only about thirty. But the smallness of number brought out the feature of the occasion. The majority present were those who had worked most prominently in the organizing of the display, and in the executive work during the run of the exhibition. If the lists of the members of the Executive and Reception Committees are consulted, the names will be seen of the greater number of the guests. At the President's table, there were seated the President of the Institution of Gas Engineers

Photo. by John H. Avery & Co.

THE GUESTS AT SIR CORBET WOODALL'S DINNER.

(Mr. Edward Allen), Mrs. M. A. Cloudesley Brereton, Mr. H. M. Thornton, Mr. W. Doig Gibb, and Mr. J. T. Jolliffe. In the vice-chairs were: Mr. D. Milne Watson, Mr. T. Goulden, Mr. H. Rayner, and Mr. F. W. Goodenough. Among the company was Mr. James W. Helps—the central figure in the Earl's Court Exhibition of 1904, and one of the first in warm congratulations to Mr. Goodenough on the success of the National Gas Exhibition of 1913.

Well, we were a happy party; and during dinner, conversation was kept going in sprightly fashion. "No toasts" was the order of the day; but the company expressed their loyalty, and gave vocal expression to it, led by a lady member of the musical party who assisted in the subsequent entertainment. The President broke his own rule of "no speeches" by making a short one, in which he spoke of his indebtedness to his guests for giving him the honour of their presence at dinner. Really, the boot was on the other leg; but no one ventured to contradict Sir Corbet, though he could not prevent his guests thinking he was wrong. He went on to say that he had asked them to join him at dinner in order that he might offer his meed of admiration for the way in which the duties of the Committees had been discharged prior to, and during, the exhibition. "Those who have done the work have done it uncommonly well. Those who have visited the exhibition have nothing but praise for the way the organization and demonstration have been carried out." There had been no hitch in any of the arrangements. They had already that day thanked Mr. Goodenough; and to Mrs. Brereton and all who had taken part in the work, the best thanks of the gas industry were due. There was cordial approval of these words on the part of the guests who were disinterested so far as membership of the Committees was concerned.

Then there was defiance of the chair on the part of Mr. Goulden. This is not habitual; but a pardonable temporary lapse. It was not altogether his fault. The suggestion came from another; and he was a willing medium, and knew he would have the backing of all the guests. He reminded his fellow guests that there was an exception to every rule; but he was not then going to endeavour to prove that this was so. As the Chairman would not allow speeches, three words would meet the requirement; and they ought not to leave the table without uttering them. The three words were: "He is a jolly good fellow." Numerical accuracy on this occasion did not trouble Mr. Goulden, nor particularly anybody else present, though one lightning calculator made four words, and another six, of what so well expressed the views of all. Upstanding, we drank to the health of Sir Corbet; and the words of Mr. Goulden's description were embroidered with as much melody as some thirty men's voices, *plus* one lady's, could manage. But what we lacked in vocal unison and note, we made up for in heartiness.

Then the artistes who had been engaged for the occasion treated the company to some excellent songs and a ventriloquial entertainment. At an early hour, there was separation, amid further personal congratulations over the work the material part of which was to end on the morrow, but not its influence for good.

LAST HOURS AT THE EXHIBITION.

Things were taking quite their normal course on Saturday night at the exhibition when the writer arrived there about seven o'clock. People were passing up the steps in excellent numbers; and, beyond the turnstiles, it was at once seen that there was the ordinary big Saturday attendance, and everything was proceeding as though the most popular exhibition on record in the British gas industry was not within three hours of its end. The gas-engines were running rhythmically compressing air, or generating electricity, or running without load, and performing their work of demonstration as though this was their destined and permanent lot in life. The crowds were the same round the 'prentice lads stand, the laundry, the meter makers' stand, the printers' stand, the mantle makers' stand. Not a few, too, were peering into the open mouths of the incandescently heated furnaces and muffles. Passing to the arcade of shops, the throng there was at the time so dense that progress was necessarily slow. In the domestic section visitors were just as thickly placed; and the attendants were busy describing to interested ones the virtues of the lights, the fires, the kitchen goods, the hot-water heating apparatus. There was not a continuously vacant place at any time in the seats surrounding the stand where the popular band of the Scots Guards has throughout added to the attractions and pleasures of the halls. The artists' studio appeared to be very popular. The bedrooms, nurseries, and kitchens in the model houses were as usual claiming particular attention from the ladies, who are better experts in the fitting-up of such places than mere men can ever hope to be. In the succeeding sections, the patronage was as great as ever. Even the chemical laboratory and photometrical rooms had passing through them a constant stream of people.

Further on, visitors seemed as hungry as ever, judging from the condition of the tables in the tea and general refreshment room. The doors of the cookery demonstration room stood wide open; the denseness of the audience being so supplemented by

new-comers who desired to be members of it, that it was quite impossible to keep the doors closed. Going along the writer ran up against the Hon. Secretary of the Institution (Mr. W. E. Price); and this reminded that there had not been noticed many gas engineers mixing with the throng of strangers. The reception room was open, and there was a goodly crowd in it; and someone, having found a piano there, was engaged in giving the people an impromptu selection, from which the writer beat a hasty retreat. Penetrating to the public lighting section, the lights were brilliant, and there was a large number of people even there.

Retracing steps, the restaurant tempted. At one end there was a long table laid; and presently in trooped the black-frocked lady attendants, and took seats at the table. They seemed to be intent on merry-making before being disbanded; and there was abundant evidence that they did not need any manly presence to enable them to thoroughly enjoy themselves. The customary demure attitude during the time they had been on duty at the exhibition was now cast aside; and they showed their capacity for detaching themselves as freely from work and going over to pleasure as they had proved their ability during working hours to give themselves up entirely to serious duty. Back again in the corridor, it was found that the lecture room was filled, with an audience intent on hearing what Mr. Webber had to say about meters, as though the construction and the working of meters were the most engaging of all matters on this night of the closing of the display. In the chair at the lecture was the Chairman of the Croydon Gas Company, Mr. Charles Hussey, J.P., whose face always appears to have a geniality about it that will not come off. Outside, making his way through the people, was observed, immerged in thought, Mr. F. W. Goodenough, who seems to have practically lived at the exhibition during its course, for no matter the hour, the writer has never missed finding him there when he has wanted him. Among others Mr. Walter T. Dunn, Secretary of the Institution, and Mr. Arthur Griffith, Secretary of the Society of British Gas Industries, had come along in order to be last nighters. So, too, had Mrs. Cloudesley Brereton.

The writer made another and a final round of the big display. About 9.30 the band stopped playing; and then came voices from the farther parts "All out, please." The secret of this was that at 10 o'clock the dismantling of the exhibition was to begin; for the gas industry, as the tenant of the Shepherd's Bush buildings, has to give up possession within eight days from the closing of the demonstration. As the writer looked round, this seemed something of a herculean task; but it is going to be done. As one of the crowd, the writer passed on. The first sign of the impending dismantling was noticed at the sulphate of ammonia stand, where it was found that the hen and her chicks had migrated from the miniature farmyard. The second sign was a workman in the Post Office taking down the fittings; the third, an artisan visitor passing along the Industrial Hall with a monster mangel-wurzel that had been nourished, and gave ocular demonstration of having fared well, on sulphate of ammonia. The insistent cry at the rear, "All out, please" came nearer and nearer. The writer paused near Crossley's stand; one of the engines here was still running, as were others on other stands. The clock was just on the stroke of ten; the last of what had been a huge crowd of visitors was passing through the swing doors. Mr. Goodenough was there at the finish, and paused to say "Good night." The Deputy-Chairman of the Executive Committee (Mr. H. M. Thornton), came across for the same purpose. Glancing back along the Industrial Hall, it was deserted save for the attendants collecting their belongings; while a workman on Crossley's stand was already beginning to remove the belting from the big engine.

This was the serious beginning of the end of the memorable and highly successful demonstration as the writer has intimately known it this month and more past. There was almost a feeling of regret that the finish had come, for the exhibition has had a powerful influence, the effects of which will spread in several ways, and for long to come, not only in business, but in assisting in placing the gas industry in its rightful position in the eyes of the public. The exhibition has also been the scene of much personal pleasure through the attraction to it of gas men from all parts of the United Kingdom and abroad. But the writer passed from it. The roller shutters at the entrance were drawn; and closed from view the still brilliantly lighted hall. To those who made it all that it was and has been, and will continue to be in its influence, the thanks of the gas industry are due.

PRESENTATION TO MR. GOODENOUGH.

Among the concluding incidents at the exhibition must be mentioned the presentation, on Friday last, of a grand pianoforte to Mr. F. W. Goodenough, the Chairman of the Executive Committee, which had been subscribed for by a number of friends associated with him in the work of the exhibition. A large proportion of the total number of the subscribers—about 175—were present. In making the presentation, Sir Corbet Woodall, who was supported by Mr. Edward Allen, Mr. D. Milne Watson, Mr. W. D. Helps, Mr. H. M. Thornton, and others, bore eloquent testimony to the arduous character of the services rendered by Mr. Goodenough, and to the great success resulting from them. Mr. Goodenough expressed his appreciation and thanks in a speech of much feeling, in which very full acknowledgment was made of the help which he had received from all sections of the administrative Committees. The piano bears the following inscription

> Presented to Mr. F. W. Goodenough, in recognition of his earnest and valuable services in connection with the National Gas Congress and Exhibition, 1913, by friends interested in its success.

COOKERY COMPETITION AWARDS.

Distribution of Prizes by the Lady Mayoress.

The eve of the closing of the exhibition was marked by several pleasant functions; and one of these was the distribution of prizes in connection with the numerous cookery competitions which constituted an attractive feature throughout the month. The competitions were of a varied nature; and it was pointed out in the programme that they had been designed specially to demonstrate and to teach the economy of fuel that can and should be secured by the use of gas for cooking. Therefore, in adjudicating upon the work of competitors, special note was taken by the judges of the economy, or the lack of economy, in the use of gas by the competitors.

As the time fixed for the ceremony approached, the lecture room, in which it was to take place, filled with people, some of whom probably had come in consequence of the announcement that the Lord Mayor (the Right Hon. Sir David Burnett, Bart.) was to visit the exhibition, accompanied by the Lady Mayoress, who would distribute the prizes. The distinguished visitors on arrival were met by the Chairman of the Reception Committee (Mr. D. Milne Watson) and the Chairman of the Executive Committee (Mr. F. W. Goodenough), and conducted to the lecture-room, where they were received by the President of the exhibition (Sir Corbet Woodall, D.Sc.), and the Lady Mayoress was presented by the youngest prize-winner with a bouquet.

The Success of the Exhibition.

Sir Corbet Woodall, when the guests had taken their seats on the platform, gave a brief account of the success of the exhibition, and referred to the cookery competitions. He said that if ever a multitude spoke with one voice, he thought it did so that evening, when he expressed to the Lord Mayor and Lady Mayoress their thanks for their kindness in being present, and to her Ladyship for undertaking to give the prizes. He spoke, not only on behalf of all those who were present, but also for the vast number of people who were interested in the work being done, and those connected with the industry which the exhibition represented. They were under obligation to the Lord Mayor, not simply for his presence with them that evening. As they knew, he came to the opening of the exhibition; and he had been exceedingly good to them in other ways. [Applause.] Among the kindnesses he had shown to them, the Lord Mayor had allowed the use of his palatial, though temporary, City home for the conference of the British Commercial Gas Association. With regard to this, all he could say was that, while they were grateful indeed for this privilege, they had in return prepared a humble but durable domicile for both the Lord Mayor and the Lady Mayoress in their memories and in their hearts. A month ago, the Lord Mayor was so good as to open the exhibition in these halls; and he (Sir Corbet) felt that, in now coming again to see them that evening, the Lord Mayor was in reality coming to receive an account of their stewardship in regard to the exhibition which he had committed to their care. Well, they thought they could report that it had been a great success. They did not think any exhibition had ever had a more interested body of visitors than this one had. The conferences had attracted to themselves a body of men and women who were thoroughly capable of talking upon the many subjects discussed. Papers had been read by eminent persons in the medical, scientific, and educational worlds, and by social workers of wide repute; and the questions of cooking, of hygienic lighting, heating, and ventilation, of capital and labour, of the industrial uses of gas, and so on, had been considered. The same with the lectures. There had been a lecture, he believed, every night during the run of the exhibition; and they had been crowded by appreciative audiences, who had listened to popular addresses on matters of strong interest. In addition, there had been cookery lectures twice a day; and Mr. Goodenough had reported to him that these had proved almost too popular, because the room had been crowded beyond the limit of comfort at nearly every lecture. All these things were satisfactory in their way; and he hoped they would be satisfactory to the Lord Mayor. Then, besides cookery lectures, they had had, as all of them knew, cookery, competitions, which had brought out, he was told, a considerable amount of merit. He personally had a very strong feeling with regard to this cookery question, because he believed it was probably the most important item of all the social subjects that were discussed with a view to the improvement of the lives of the poorer classes throughout the country. [Applause.] He could hardly conceive a cottage in which there was a housewife who knew how to cook, and in which at the same time there was dirt and discomfort. Good cookery was almost impossible without cleanliness; and the two combined would make a home which would hold a husband, rather than drive him to the public-house. With regard to the immediate object of their gathering—the cookery competitions—he would call upon Miss Helen Edden to read out the names of those who had won the prizes. Miss Edden had had on her shoulders a

Photo. by John H. Avery & Co.

THE LADY MAYORESS ABOUT TO PRESENT THE PRIZES TO THE BOY SCOUTS.

very heavy burden of responsibility; and she had borne it extremely well. ["Hear, hear."] Before, however, calling upon Miss Edden to take her part in the proceedings, and the Lady Mayoress to be so kind as to present the prizes, he desired to express the great grief they had all felt that one of the prize-winners in the Sea Scouts' Competition should have been drowned in the unfortunate sinking of the boat in the Thames some days ago. Their sympathy went out to his relatives.

Some of the Prize-Winners.

Miss Helen Edden (the Hon. Secretary of the Cookery Lectures and Competitions Committee) was then presented to the Lady Mayoress, and proceeded to read out the names of the large number of prize-winners, who, one by one, as they were called, passed along the front of the platform, and received their rewards from the hand of the Lady Mayoress. The fortunate competitors included, as will be understood from a glance at the different competitions, boys and girls and adults of both sexes. Some of the principal prize-winners, and the titles of the competitions, are appended. The distribution of the awards manifestly caused much pleasure, not only to the recipients, but to the audience.

Children.

First Prize: Ivy Sadler, Isabella Wright, B. Sherrett.
Second Prize: Mary Seal, Edith Wootton, Catherine Birch, Annie Williams, Millie Hosh, Betty Rogers, Sarah Gilbert.

Scouts.

First Prize: Frederick Hunt, J. Laskey, Leonard Wright.
Second Prize: A. Grantham, P. Barrett, S. Turner.

Church Lads.

First Prize: Sergeant Wakling.
Second Prize: A. Anderson.

Girl Guides.

First Prize: Kelly Cameron.
Second Prize: Kate Hedger.

Sea Scouts.

First Prize: T. Jones.
Second Prize: C. Reed.

Territorials.

First Prize: G. F. Smith.
Second Prize: C. Snelling.

British Red Cross Nurses.

First Prize: Miss Thornhill.
Second Prize: Miss Stanley, Miss Walfold.

Housewives.

First Prize: Mrs. Beck.
Second Prize: Mrs. Davis, Miss Harrison, Mrs. Lindley.

Bachelors.

First Prize: D. Harvey.
Second Prize: L. Church.

Bachelors v. Ladies.

First Prize: Mrs. Webb.
Second Prize: Mr. Danbury.

Cook Generals.

First Prize: Miss Florence Smith.
Second Prize: Miss Earley, Miss Chappin.

Pastry Competition.

First Prize: Mrs. Davis.
Second Prize: Miss Morgan.

Pancakes.

First Prize: Mrs. Twyford, Mr. Sapp.
Second Prize: Miss Phillips, Mr. Picot.

Home Competition.

Tea Trays.
First Prize: Mrs. Senn.

Cakes.
First Prize: Mrs. Barrett, Mrs. Belshire.
Second Prize: Mrs. M'Kinley, Mrs. Egholme.

Two-Shilling Lunch for Two People.
First Prize: Mrs. M'Kinley.

Home-Made Bread.
First Prize: Mrs. Macfadden, Mrs. Livesey.
Second Prize: Mrs. Steward.

National Competition.

England.
Plum Puddings.—First Prize: Mrs. Ivens, Mrs. Hayward.
Mince Pies.—First Prize: Mrs. Wynne.

Scotland.
Scones.—First Prize: Mr. Schweitkardt.
Shortbread.—First Prize: Mrs. Davidson, Mrs. Mandler.

Ireland.
Boiled Potatoes.—First Prize: Mrs. Wilson.

Wales.
Bara Brith.—Miss Egholme.

Thanks to the Lady Mayoress.

Mr. Edward Allen, on the completion of the distribution, said he had the honour to propose a very hearty vote of thanks to the Lady Mayoress for coming and giving the prizes to those who had been fortunate enough to win them in the competitions. Those connected with the exhibition were very grateful for the interest taken generally by her Ladyship in the work they had been doing, and for the special interest she had taken in the cookery competitions. They quite understood how any thoughtful woman would feel a deep interest in a matter of such great importance to the people of the country. Those connected with the gas industry were proud to feel that, by means of gas-cookers, the cooking of their native land was greatly improved. With the gas-cooker the heat could be regulated to suit all requirements; and he was sure those of them who had attended any of the demonstrations had been delighted with the success with which the food was cooked—with its appetising appearance and the delicious odours. It appeared to him that, not only in the artizan's cottage, but in every home in every rank of life, happiness very much depended on efficient cooking; and if he might make a suggestion, it would be that bachelors would do well to look over the list of their prize-winners when engaged in the important task of choosing a suitable wife, to enable them to enjoy the happiness that everyone was entitled to.

Mr. Milne Watson, in seconding the vote of thanks, remarked that it was extremely kind of the Lord Mayor and Lady Mayoress to pay a second visit to the exhibition, during their busy year of office.

The vote was put by Sir Corbet Woodall, and carried amid loud applause.

The Lord Mayor's Appreciation.

The Lord Mayor, on rising to return thanks, caused a burst of merriment by remarking that when he was at home his wife spoke for him, but when he was out he spoke for her. On behalf of his wife, he thanked them very much indeed for the vote. It had been to her, and to him, a very great pleasure to visit the exhibition again. They were there at the birth of the exhibition; and he would like to take this opportunity of congratulating Sir Corbet Woodall and all associated with him on their boldness, because they had evolved this scheme, and adopted a very bold way of carrying out their ideas. They carefully prepared, tilled, and sowed the ground, conscious that they had a fruitful seed. They knew that the ground had been properly prepared for this seed, so that they might look forward to an immediate and very rich crop. He thought he was justified in saying that this was a wonderful exhibition in many respects. Probably one of the causes of it being a wonderful exhibition was that the President had had the wisdom to call to his aid the services of a lady,

Mrs. Cloudesley Brereton, who no doubt had given him many good ideas, including that excellent idea of the rest-room. [Laughter.] The exhibition was of a most interesting character; but above all, it had been of educational value, not only to those engaged in the industry, but to the public generally, because it had brought home to them in a way that could not have been brought home to them by any other means, the great improvements that had taken place in the application of gas, and its great advantages, not only as an illuminant, but as a heater and for cooking purposes. It had demonstrated fully what economies might be achieved, not only in the cost of cooking, but also in the cooking itself; how many articles of food might be more economically dealt with by gas than other fuel; and, above all, the great saving of labour. In these days, there was quite a revolution in the home. The desire of those who had limited incomes was to have small homes but pretty ones; and nothing was more antagonistic to the accomplishment of this than to have the old-fashioned range, with a large fire to cook, perhaps, a very small bloater. The tendency he had referred to became stronger as education grew, because an increase of education meant the creation of a love of the beautiful, and with the love of the beautiful there came a determination not to have the houses that were considered good enough thirty or forty years ago. People wanted smaller houses, less labour, and more comfort. Of course, the exhibition was not a philanthropic one. It was for the gas industry. But in protecting their industry by promoting its sphere of usefulness, they were carrying on a very great public work; and it was for this reason that his wife and he had experienced so much pleasure in being present that evening. The suggestion that Mr. Allen had thrown out to bachelors looking for wives was a good one. It was a very great advantage to have a wife who knew something about cooking, especially as, on this occasion, not only with regard to the pupils but to the teachers also, considerable personal attractions were combined with the cookery qualifications.

Three cheers were given for the Lord Mayor and the Lady Mayoress; and the proceedings concluded with the singing of the National Anthem.

POPULAR LECTURES.

THE USE AND ABUSE OF LIGHT.

A lecture, with lantern illustrations, was delivered on Monday evening of last week, by Mr. LEON GASTER, who set himself to explain in a popular manner what is meant by "the use and abuse of light"—pointing out that the term "abuse of light" should also include the misuse of light; there being many cases in which the full advantages of an illuminant are not secured, owing to some want of care in its application. He said that the opportunities for the judicious use of light are greater to-day than they ever were; but to make the best use of our illuminants, we must constantly bear in mind that "Light is the cause, illumination the effect." It is most important that all those responsible for generating light should study illumination, and make sure that the light produced is wisely used. It may be hoped that the many excellent examples of good lighting shown at the exhibition will do much to foster this study. With regard to the chief points to be observed in order to secure conditions of illumination that are pleasing and useful, there is still much to learn; but there are several points on which those who have studied the subject are already agreed: (1) There should be no "glare." (2) The light should be steady. (3) The light should be sufficient. (4) The light should come from the right direction, and should not cast inconvenient shadows.

Dealing with "glare," Mr. Gaster referred to the blinding motor headlights, and went on to remark that there are many street-lamps which appear to have the same effect. When a driver, rapidly turning a corner, comes into view of a very powerful light low down in the line of vision, he may be temporarily blinded, and a moment's hesitation may mean an accident. There are many who believe that the "abuse of light" by improperly placed and imperfectly screened street-lamps has not a little to do with the recent increase of accidents in the streets. With our modern fast-moving traffic, well arranged as well as bright illumination is needed; and the Board proposed to control the traffic of London ought to consider the lighting of the streets as well. At the present day, a man may apparently place outside his shop an unscreened source of light which is a cause of annoyance to passers-by, and a menace to the safety of traffic, without any objection being taken. The approach to such dazzling lights ought to be made by gradually increasing the illumination up to the shop, thus avoiding the sudden contrast of surroundings.

The lecturer quoted figures and facts in support of the view that a greater amount of light is now demanded than was the case a few years ago; and he laid special stress on the questions of the illumination of dark materials and the absorption of light when dark-coloured wallpapers are used. He admitted that we have still to learn exactly how much light is needed for various industrial processes, and suggested that what should be done is to ascertain exactly how much light is needed for all these operations (taking into account the experience of the employees in the best lighted works), and use this as a guide for other works—raising thereby the quality and the quantity of work done under artificial illumination. Good lighting pays master and men from every standpoint. The proper use of shades and reflectors and the necessity for seeing that the light comes from the right direction were then touched upon; and Mr. Gaster summarized what he had said by quoting the recommendations from a pamphlet recently issued by the "Illuminating Engineer," and distributed by the British Commercial Gas Association: (1) Don't work in a flickering light. (2) Don't expose the eyes to unshaded lights in the direct range of vision. (3) Don't judge illumination by the brightness of the lamps. (4) Avoid excessive contrasts. (5) Use the right type of globe, shade, or reflector. (6) Make sure that the illumination is sufficient. (7) Keep lamps, globes, and reflectors clean. (8) Make sure that lamps are in the right position.

Attention was drawn by Mr. Gaster to the importance of the maintenance of lighting in good condition when once it has been installed—especially incandescent gas-lamps; and he had a good word to say for the maintenance systems of gas undertakings. Some few practical suggestions with regard to the lighting of the home were offered; and the lecture concluded with the remark that the Illuminating Engineering Society are doing a great work in leading the public to appreciate what the wise use of light can do, and it should be the policy of the gas industry to encourage these efforts for the benefit of the public, and from which they will reap the due reward in time to come.

A PENNYWORTH OF GAS.

On Friday evening last, Dr. C. W. SALEEBY repeated his popular lecture on this subject, an abstract of which appeared in our last issue, p. 349. It had been arranged that the chair on this occasion should be taken by the Chairman of the Huddersfield Corporation Gas Committee, Alderman Jessop. In his unavoidable absence, in consequence of a very important municipal election engagement, Mr. Edward A. Harman, M.Inst.C.E., the Engineer and Manager of the Huddersfield Corporation Gas-Works, occupied the chair, and offered an apology for his Chairman's inability to be present.

In a few remarks respecting the subject under consideration, Mr. Harman said it might not perhaps be out of place for him to point out that some sixteen years ago the Huddersfield gas undertaking commenced supplying gas by the pennyworth, and the system had steadily grown until for the year ending March 31 last, the total amount collected through the penny-in-the-slot meters was about £37,000; while the total number of consumers availing themselves of the facilities afforded by these meters was 18,500, out of a total of 31,000. The popularity of the slot system was amazing. Probably the chief reason was the prevention of a gas account and the terror of the unknown. One of the reasons for its popularity in Huddersfield was the adoption of a discount system of payment, which corresponded nearly to the co-operative system of dividends so popular in the North. The consumer is handed back 3d. in the 1s. at the time of collection, which ensures an appreciable interest being taken in this operation by the householders. Certainly there is not any delay in obtaining admission to the houses. People preferred a reduction in the price of gas to be made in the tangible form of an increased discount, which was looked upon as an easy means of saving money. The system also afforded a very convenient check upon the amount of gas used. A penny-in-the-slot meter brought home to the consumers most effectively what can be accomplished by a pennyworth of gas. This could be demonstrated in a great variety of ways. The average quantity of gas supplied for a penny was about 30 cubic feet; but in many towns like Huddersfield the amount reached 40 cubic feet. With 30 cubic feet of gas, a light by means of an incandescent burner could be obtained for about eight hours; a dinner for a small family could be cooked; or water could be boiled for the weekly wash. To all slot consumers requiring it, a gas-cooker was supplied free. The benefit of this in a home was incalculable. Take, for instance, a young married couple. The husband could and did light a boiling-ring directly he got up in the morning; and by the time he was dressed, a supply of hot water was available for a cup of tea before going to his work, as also one for his wife. It had been urged in some quarters that a falling off in the number of applicants at the public-house for a cup of hot coffee and rum was attributable to the policy of the gas undertakings sending out a cooker free. Gas-heated coppers are most extensively used in Huddersfield, both with prepayment and ordinary meters. In the last published parliamentary returns, the number of gas consumers in the United Kingdom was given as 6,649,904, and it could be taken that at least one half of these were prepayment meter consumers; so that the multiplication of the unit of a pennyworth of gas could be scarcely comprehended.

It would ill become him to trespass further upon the subject of the lecture; and he therefore contented himself by stating that what had been accomplished in the past by means of a pennyworth of gas was nothing compared with what is yet to be.

At the close of the lecture given by Mlle. Claire de Pratz on "The French Hostess and Her English Sister" at the National Gas Exhibition on the 18th ult., as noticed in the "JOURNAL" the following Tuesday, she stated, in answer to a question by Mr. Goodenough, that the price of gas in Paris was 20c. per cubic metre, which was explained by him to come to about 5s. 8d. per 1000 cubic feet. It has been pointed out to us that the equivalent figure should have been given as 4s. 6½d.

CONFERENCE OF EMPLOYERS.

LAST Tuesday there was a conference of employers—one more of the series arranged in connection with the exhibition. In all, five papers were submitted; but though the matters dealt with were of extreme interest from a social point of view, considerations of space unfortunately prevent us giving more than the briefest indication of them. The chair was taken by Lord ROTHERHAM, of Broughton, in the regretted absence of Earl Grey.

Lord ROTHERHAM, in opening the proceedings, said the subject of co-partnership was never so urgent as in these days of industrial unrest. The interests of capital and labour had much in common. Indeed, they were almost identical; and yet some agitators maintained that they were hostile. Unless capital could be adequately remunerated, it could not for long be in a position to employ labour; and it was very probable that the remuneration of capital would be on a more substantial scale if the goodwill and self-interest of the employees could be ensured by some such system as co-partnership.

CO-PARTNERSHIP AS A MEANS OF INCREASING THE PROSPERITY OF BOTH CAPITAL AND LABOUR.

Mr. ANEURIN WILLIAMS (the Hon. Secretary of the Labour Co-Partnership Association), whose work in connection with co-partnership is widely known, was the author of the first paper, in which he pointed out the many advantages secured by the adoption of the principle. He quoted the following table compiled by his Association.

Particulars of Co-Partnership and Profit-Sharing in British Gas Companies at December 31, 1912.

Name of Company.	Number of Years Scheme has been in operation.	Capital in 1912. Total Share and Loan.	Number of Employees under Agreement for Profit-Sharing or Co-Partnership.	Amount divided among Employees for year ending December, 1912.	Amount per cent. on Wages.	Total Profit to Employees since scheme was adopted.	Amount of Shares and Deposits held by Employees in the Company. Market value on Dec. 31, 1912 (about).
		£		£		£	£
Sth. Metropolitan (*a*)	23	8,325,340	5,951	45,350*	8¾	594,059	439,065
South Suburban (*b*)	19	1,432,281	606	4,030*	7	44,483	42,262
Commercial	11½	2,548,280	1,226	6,818*	6	58,813	54,319
Chester	11½	209,650	72	411*	6¼	2,947	2,318
Epsom and Ewell	5	89,089	42	140	—	531	345
Leamington Priors	5	82,500	103	389*	5	1,825	2,052
Wrexham	5	140,600	66	391	7½	1,654	2,113
Bournemouth	4½	700,195	416	2,863	8	8,696	6,468
Rugby	5½	59,327	50	204	6	1,067	787
Tottenham	4½	753,410	625	3,951	7½	17,827	20,190
Tunbridge Wells	4½	178,266	143	660	6	2,660	2,621
Walker & Wallsend	4½	271,918	98	396*	4¼	1,500	4,390
Wellingborough	4	90,853	63	321	6	1,109	1,102
Croydon	4	697,252	569	2,696*	5¾	7,069	13,521
Dartford	4	112,346	38	170	4	644	630
Gaslight and Coke	4	29,571,883	9,650	40,870*	4⅝	137,898	135,105
Gloucester	4	228,302	108	532*	7	1,857	2,116
Weston-super-Mare	4	121,320	104	369	4⅝	1,151	355
Grantham	3¾	106,000	48	186	5¼	481	517
Cambridge	3½	199,764	179	869	6¾	2,373	2,271
Cardiff	3½	703,014	297	1,082	8⅛	3,435	3,162
Enfield	3½	207,360	139	485*	4½	1,382	1,242
Ilford	3½	280,505	159	721	4½	2,195	2,247
Waterford	3½	70,900	52	326	8	698	540
Watford	3½	194,605	111	501	4½	1,660	1,620
Longwood	2¾	99,569	35	158	6¼	330	152
Wandsworth & Putney	3	548,262	360	2,431*	7	4,117	2,989
Merthyr Tydvil	2	81,253	34	84	3½	164	—
Harrow	1	237,988	94	290	4	576	—
Plymouth	2	391,500	294	1,080†	5	1,845	1,896
Aldershot	1	377,580	138	334*	3	334	—
Liverpool	1	1,986,973	1,850	4,962*	5¼	4,962	—
Hertford	1	22,609	30	81	5	81	—
	—	51,120,694	23,750	124,151	—	910,414	746,395

* Year ending June. † Year ending March. (*a*) Three employee representatives on Board. (*b*) Two employee representatives on Board.

Two years ago it was suggested to the Labour Co-partnership Association that actual figures should be collected showing the total benefits which have accrued to the shareholders in co-partnership gas-works, and to the consumers, since each scheme was adopted. It has not, said Mr. Williams, proved possible to do this very completely; but the figures given in the next table, so far as they go, are at least suggestive.

Though the figures of profit to employees and saving to consumers are included in this table, our immediate business is with the profit to shareholders. The prices of coal and residuals and many other factors affect profit so greatly that it is impossible to say dogmatically whether a certain result in a certain case is due to co-partnership. In all economic questions, the clear light of commonsense and of probability is usually a safer guide than

Advantages since the Schemes were Adopted.

Name of Company.	No. of Years.	Total Profits to Employees.	Increased Profits to Shareholders.	Value to Consumers of Reduction in Price of Gas.	
				Per 1000 Cub. Ft.	Total Amount.
		£	£	d.	£
Chester	10½	2,947	Max. Div.	7	7,000 per ann.
Tottenham	4½	17,827	2,979	—	25,693
Tunbridge Wells	4½	2,660	922	—	6,200
Walker and Wallsend	4½	1,500	188	—	530 per ann.
Wellingborough	4	1,109	254 (1 year)	—	1,290 (1 year)
Croydon	4	7,069	6,600	—	33,056
Gloucester	4	1,857	—	5	—
Weston-super-Mare	4	1,151	Max. Div.	2	—
Grantham	3¾	481	*Nil*	2	—
Cambridge	3½	2,373	Max. Div.	1	—
Cardiff	3½	3,317	Max. Div.	2	11,000
Enfield	3½	1,381	*Nil*	2	6,000
Ilford	3½	2,195	740	—	5,137
Waterford	3½	698	438	—	1,377
Longwood	2¾	330	¾ per cent.	3	—
Merthyr Tydvil	2	164	⅛ per cent.	1	—
Plymouth	2	1,845	*Nil*	—	*Nil*
Hertford	1	81	*Nil*	—	*Nil*

figures of particular instances. Figures, to be conclusive, must be collected over a very wide area, and scrutinized with very great care. Still, these figures, so far as they go, do support what reason leads us to expect. They show also, as the fuller figures given above show, that the profit to labour is a very substantial addition to the earnings of the workers in these companies; and there is no reason to doubt that, apart from the dividend, their wages are up to the standard paid for similar work elsewhere.

As the result of an inquiry made by Mr. Amos Mann, of Leicester, as to wages and conditions in the second largest of the London gas-works, the author said it might be taken that the profit divided on wages is a clear addition to earnings; and in 1912 it averaged more than five guineas per head.

Mr. D. MILNE WATSON proposed a hearty vote of thanks to Mr. Williams for his paper. There were, he said, one or two things which were necessary for the success of co-partnership, and perhaps the principal one was that it must not be taken as likely in any way to reduce the standard rate of wages. If any employer thought that by a co-partnership scheme he would be able to save his wages bill, he was making a great mistake, and would be well advised not to touch it at all. Co-partnership must be something over and above wages. Another point was that probably the greatest good of co-partnership was the new spirit which it brought about. Labour and capital must work together if they were going to be successful; and it was his opinion that up to the present co-partnership was the scheme which gave the best hope of a solution of this difficult problem. If there was the right spirit among the men, and also, he might say, among the employers, many of the difficulties facing them at the present time would fade away. The men wished to feel that they were not merely parts of a machine, but were human beings, and that they had higher interests than merely handling some tool or pulling some handle. By the committees which formed an important part of most co-partnership schemes, a means was provided by which matters of interest to the business could be discussed with the workmen. These committees served to bring the men together with the employers and the chief officials in a way that nothing else had ever done; and thus employers and employees were working together for a common interest and for a common good.

Mr. ALEX. P. MAIN seconded the vote, and agreed that in co-partnership seemed to lie a solution of much of the labour unrest. It was idle to deny that the labour leaders were to a large extent hostile to co-partnership; but it would be making a great mistake to suppose that the labour leaders would determine this question ultimately. Anybody in touch with workmen, and who talked to them, speedily realized that the working man to-day was a very cute observer. He was an excellent judge of character; and in many cases where the men had thrown over their leaders, they could give good reasons for their action. Mr. Williams's paper would be an excellent one to distribute among working men.

The vote having been carried,

Mr. WILLIAMS, in thanking the meeting, agreed that co-partnership schemes must not be regarded from the point of view of reducing the standard wage. As to Mr. Main's remark upon the attitude of the labour leaders, it was perfectly true that there were many who were hostile to the co-partnership principle; but the more respected trade union leaders were strong supporters of it. The position of the majority of labour leaders was that they

had not yet made up their minds. He desired to emphasize most earnestly to employers that, if this movement was to go forward rapidly, and with success, as he believed it might, it could only do so with the goodwill of the trade union leaders, who must be made to understand that there was nothing in the principle hostile to the standard wage and standard conditions, nor to fair collective bargaining as to wages and conditions generally.

At this point in the proceedings, Lord Rotherham was compelled, owing to another engagement, to leave; and a cordial vote of thanks was accorded to him. Mr. D. MILNE WATSON took the chair.

THE RELATIONS OF SCIENCE AND INDUSTRY.

Sir ALFRED KEOGH, K.C.B., LL.D., M.D., dealt ably, in a paper bearing this title, with the work of the Imperial College of Science and Technology. He expressed the conviction that the academies alone cannot provide for all the requirements of the future, and that, unless the industries become part of the machinery of higher scientific education, neither the Government nor the Universities will accomplish, with a full measure of success, the ends in view. He traced the events which led up to the creation of the institutions known as the Royal College of Science and the Royal School of Mines, to the establishment of the Science Museum and the City and Guilds of London College, and to the recognition by the country generally of Kensington as a scientific centre. But, he said, the efforts to set up scientific education in the country, though highly successful, had not in the end reached the highest level of efficiency, and had not yet been established on the highest plane. It was different, for example, in Germany, Switzerland, and the United States. In all these countries strenuous efforts had been made for higher scientific education, and many institutions for instruction in the applications of science set up, which had since become famous. It was not until 1906 that the necessity for the establishment here of a college of the foreign type was recognized, and steps to establish it were undertaken. The recommendations of a committee led to the establishment of the Imperial College. The purpose held in view has been to train young men for professions connected with the industries.

The State, the Commissioners of the 1851 exhibition, and the City of London were, as essential elements in scientific education, reinforced by the Institution of Civil Engineers, the Institution of Mechanical Engineers, the Institution of Electrical Engineers, the Iron and Steel Institute, the Institution of Naval Architects, the Society of Chemical Industry, the Federated Institution of Mining Engineers, and the Institution of Mining and Metallurgy, who were all called upon to take part in guiding to a successful end the objects of the undertaking. As if this were not enough, the Governors were later on urged by their own committees to make closer the union of the College with the industries by setting up such Advisory Boards as might bring them into direct connection with special industries, and by the appointment of lecturers, or of associated professors, from among those actually engaged in industrial work and were eminent in their departments of applied science. He ventured to think that all this represented an earnestness as great as that which had led to results so good in Germany, in the United States, and in Switzerland. If it meant anything, it meant an invitation to the industries to join the College. This, then, was the Imperial College. The story as he had told it was the history of South Kensington in relation to the development of scientific education in England. He thought the record was an honourable one. It was the natural *rôle* of Kensington to be in the front of the new movement. Its old *rôles* had been fulfilled.

Ever since he became acquainted with the problem of higher training in the applications of science, he had been struck by the fact that it was the absence of a definite organic connection between the factory and the school which was responsible for the existing shortcomings in higher education. The factories must themselves play a part. However useful "visits" of academic classes to factories might be, they were wholly insufficient, and in his opinion should be replaced by the attachment for fixed periods of small classes of advanced students and of research fellows to the laboratories of the industries. Sir Alfred continued: I am speaking now with some experience of the method, and am not putting forward a crude theoretical design. I am encouraged to press the point upon you, because of a trial which has been made in connection with one great industry. Professor Bone, in seeking to perfect the training of advanced students of chemistry, and well aware of the value of the factory in the scheme of practical education, has transferred his students for definite periods from his laboratories for the study of large-scale processes, where he has been able to place them under supervision on an organized plan. The effect on the efficiency of these young men is one of the most impressive facts with which I have become acquainted. For the first time they have been brought into contact with the realities of chemistry, and have exchanged the dullness of the academy for the living active industrial world. Their outlook is immensely widened, their spirits are chastened, they are more ready to appreciate the importance of those subjects to which, on their return to Professor Bone, they are introduced. At Skinningrove these young men were placed under the supervision of experts. They were required to collate results of experimental work, handing in their results for examination and class criticism. In the ensuing year we hope to develop and extend the system. We consider that, while a five-year academic course is the minimum which the men we seek to train should undergo, much of the time of the final two years should be spent in industrial works as part of the college training.

The author, in concluding his paper, said it is the experience of the College, and apparently the experience of others, that the need for a Central Bureau of Information in Applied Science is being increasingly felt. The collection and tabulation of recent scientific work, so that it may be immediately available, is a pressing necessity for scientific men engaged in industrial undertakings. The references to the Imperial College for specific information are constant; and though every endeavour is, of course, made to supply the most precise and the fullest information, one often feels that, unless it is of a kind definitely in the line of work of an individual or of a department, omissions of great importance may occur. There exists no definite and responsible organization; and, in my opinion, we should set it up. I conceive it to be a necessity of the times that such a College as ours should establish, when it can, an Information Bureau. But this should be done so thoroughly as to leave no opportunity for adverse criticism. It should be complete in its organization and methods at the outset, and not be a thing of gradual growth. The responsibilities of such a bureau are immense; but its opportunities for supplying a need of the day are great. I cannot conceive a centre more suitable for the establishment of this bureau than London, and especially that part of London where the Imperial College is located. The magnificent science library is well known. There is collected every recent scientific paper of importance produced at home or abroad. Its situation in the Imperial College is a consideration of moment, when we come to consider the establishment of a central clearing-house of scientific information, available for workers in the applications of science.

Mr. MILNE WATSON said everybody must heartily sympathize with Sir Alfred in the two suggestions he had made—namely, the need for a central Bureau of Information at South Kensington, and the importance of the practical side of a student's training being incorporated with his college course.

Mr. A. T. JENKINS said he did not agree that London should be regarded as the clearing-house in matters relating to technical education, because in Sheffield they were very proud of the technological side of the University. At Sheffield, they claimed to have a metallurgical laboratory second to none in the world; and it was the general belief there that, when the new establishment was in full working order, students would be able to obtain a thoroughly practical and theoretical training. It was necessary to look upon education as a national question; and the best results would be obtained by the students actually going to the localities where the particular industries were centred.

Mr. T. S. LACEY said his experience with students who had been trained at the Imperial College was that they had obviously been made much more useful to their employers than they would otherwise have been. It was necessary to pursue researches very much further than the ordinary graduate could possibly do; and it should be recognized that there was in every industry room, not only for men who had undergone the training which enabled them to simply get a degree, but for men of a higher standard. Such men, by proper training, would be of use to their employers practically immediately their period of training was over; and if this was more generally recognized than seemed to be the case, no doubt it would lead to greater co-operation between works and colleges. In the gas industry, for instance, very little had been done in this direction; but there was a great field which could be profitably occupied, not only in questions relating to combustion, but also those relating to refractory materials, upon which much useful information would no doubt be forthcoming if employers co-operated more with the colleges and gave the students greater facilities for developing their faculties.

Mr. J. L. CHAPMAN thought one great reason for the lack of the class of men Sir Alfred Keogh had in his mind was the insufficient remuneration often offered. Especially among the manufacturers and suppliers of gas was it the case to offer salaries insufficient to really repay these men for the work they did. At the same time, there was every reason to be extremely thankful for the influence of such work as was now being done by the Gaslight and Coke Company in connection with their employees, and other companies who were beginning to work on the same lines. He personally, belonging to a large suburban company, found it difficult to get men to do his work unless he trained them himself. It was a subject which required very careful consideration.

Mr. CLOUDESLEY BRERETON said he wondered how the author would get round the difficulty that in a certain number of trades in this country the whole of the processes were trade secrets. Was it suggested that post-graduate students should be sent into these factories? The present educational system of training students was wrong; and a more efficient process of selecting students before their training began would have to be adopted.

Mr. F. W. GOODENOUGH, in proposing a vote of thanks to Sir Alfred Keogh, said that if employers would get over the idea that science was some mysterious outside qualification that man possessed, or was some separate entity quite apart from the practical working conditions of life, they would probably be more willing to employ scientists in their works. Science was only organized knowledge; and what they wanted to do was to get this organized knowledge applied to the practical work of life. If employers and manufacturers once got this idea as clearly into their minds as the Germans had, the linking-up of science and industry would proceed at a more rapid pace than in the past.

Mr. Jacques Abady seconded the vote of thanks, as an absolute enthusiast for technical and scientific education. He said he could not understand the backwardness of manufacturers in this country in recognizing and welcoming with enthusiasm the definite practical and material benefit that it was to them primarily, and to the country secondarily, in employing and encouraging scientific and properly-applied education. Speaking as one interested in a firm who manufactured scientific instruments and apparatus, he could say that he found the greatest difficulty in getting suitable men with even an elementary scientific education which could be applied to any great use. He was not sure that the authorities of institutions were particular enough in selecting the right type of man before they started to educate him. Before it was possible to train a man as a scientist or mathematician, it was absolutely essential that he should be suitable for this vocation. The great point of Sir Alfred Keogh was to get manufacturers to co-operate in what he properly termed post-graduate education; but, from a practical point of view, there were great difficulties in the suggestion adumbrated. It must be remembered that if a man was intended for any particular business in which scientific knowledge was required, it was necessary that there should be some super-specialization beyond the general specialization which applied to this particular branch of business; and therefore to take anyone from a college to apply his education in a particular works would connote teaching him the particular things and the trade secrets which the manufacturer had up his sleeve. It would be making him *au fait* with the particular thoughts the manufacturer had in his own mind. At the same time, he could not see any real practical advantage to the student in leaving off his studentship at what Sir Alfred Keogh would make the beginning of his post-graduate stage, and starting to work for some particular firm. He always employed men with scientific attainments; but it was an axiom with himself and his partner that the first thing to do with a scientist was to make him unlearn everything he had learned. Of course, he did not mean this really. But it was absolutely necessary that the man should go down to the bed-rock of their own particular industry and specialize in it; and if this were to form part of his post-graduate education, it would strengthen the man's armour to go and do this work in other factories. With regard to the suggested Bureau of Information, this was an excellent idea; and he hoped some steps would be taken to get manufacturers and firms interested to co-operate in the matter. Looking at the question as a manufacturer, he could not help feeling what was wanted in connection with it was a sort of bureau of available scientific men whom manufacturers could employ. It was usually a simple matter to get men with sufficient scientific attainments in the humbler positions in connection with gas manufacture and supply; but it was exceedingly difficult to get men in the higher walks of life.

The vote of thanks having been carried,

Sir Alfred Keogh, in reply, said there was already a close connection between the Imperial College and the University of Sheffield, inasmuch as there was a special arrangement between them with the very object of recognizing that institution. The Imperial College of Science did not undertake steel because of the existence of Sheffield; and the arrangement was that any work done by an undergraduate of the Imperial College of Sheffield was recognized as part of the course, and *vice versâ*. He sought the co-operation of manufacturers purely on the ground of benefit to them, because he had never known an instance in which manufacturers had not been able to hit upon an exceptionally brilliant student from among those whom he had at his works for short periods during the year. He agreed that a difficulty existed with regard to special processes and trade secrets. But there were hundreds of factories in which the processes were open; and the gas industry was one of them. Nevertheless, the subject was not an easy one; indeed, it was exceedingly difficult. But a great deal more was being done at South Kensington in the way of solving the difficulty than many people realized. After all, it was the manufacturers who were really concerned; and the present reproach levelled at the college-trained students, which he admitted was merited, could not be removed unless the industries helped to remove it.

CO-OPERATION BETWEEN THE SCHOOL AND THE EMPLOYER.

Mr. Cloudesley Brereton, M.A., L.ès L., dealt with "Co-Operation between the School and the Employer," and emphasized the fact that the community demanded there should be turned out pupils who had not merely sound instincts, but sound aptitudes, who had not merely tastes, but capabilities—potential producers in fact. Happily the business world was as vitally interested as the educationist in the production of pupils of the right type. He did not believe that the bulk of business men were interested in nothing else than buying in the cheapest market and selling in the dearest. To a certain extent he was concerned in the welfare and well-being of his employees, from a personal and a national point of view. In proof of this he quoted some typical instances of what had actually been done by various firms up and down the country. These included the experiment of the Gaslight and Coke Company (dealt with subsequently by Mr. Milne Watson), and the policy of the Liverpool Gas Company in allowing their meter-makers to attend afternoon classes. The increasing trend towards vocational education in the schools was referred to, as well as the co-operation of trade unions.

To sum up, said the author, education for life alone is one-sided education, and education for livelihood alone is equally lop-sided. The two must be combined, and as far as possible interwoven. Science, with its endless divisions, subdivisions, and analyses, has "atomized" everything, and established a series of unreal water-tight compartments in every species of organization it has invaded; so that in education the school has been thrust into one pigeon-hole, the parent into another, the employer into another, the employee into another. But all these are part and parcel of the social fabric, and must be once more brought into recognized organic connection. Or, in other words, the schoolmaster must take more interest in the boy and his future career, and so must the parent, the employer, and the trades union. The State and the locality must have their say; but to leave everything to the State or the locality is an abnegation of human responsibility in its worst form. Again, education has to be brought more into accord with the practical genius of the nation. Tell an Englishman that it gives a pupil a smattering of the Greek irregular verbs, and you leave him cold; but show him that it tends to give a man extra skill, greater appreciation and understanding of his work, and greater ability to tackle it, and show him also that it has an excellent effect on character and physique, and he will be willing to speculate in it.

Finally, we come down to the problems of here and now. There are at present in the field several schemes, attractive and otherwise, for compulsory education from 14 to 17. Some of these are certainly ill-digested (though possessing doubtless very excellent points), inasmuch as they ignore local conditions, and contain features that make them not only distasteful but difficult to work. In view of the imminence of such far-reaching changes, it is imperative alike to employers and associations of employers that they should individually and collectively possess as far as possible a first-hand knowledge and practical acquaintance of education, in order that, when such schemes are brought into the field of actual politics, they may be thoroughly well equipped to put their view on the future education of the worker, and help to render the scheme in question as far as possible useful and practical. Otherwise they may have to put up with something they strongly disapprove of. They should, therefore, at the present time, make it their business to go out of their way to get into direct contact with existing schools for both sexes—elementary, secondary, trade, technical, or university—either by joining advisory committees, or getting into touch with the principals concerned. They should help not merely in getting their recruits direct from them, but also in seeing that the stamp of recruits the school turns out more nearly corresponds to the type they require. Again, in respect of those already in their services, they can greatly help to uplift the physical, intellectual, and economic conditions of those in their employment by the payment or refunding of fees, by awards of prizes, by checking and rewarding attendance at the evening institutions, and more especially by a liberal allowance of time off, and in the larger works by maintaining the number of their apprentices, or by working through their association for what may possibly be the ultimate solution—co-operation between the association itself, the trades union, the town (and may be the Universities), in the establishment of a proper provision of apprentices in their own particular trade. In a word, in place of isolated *rapprochements*, we need an individual and a collective *entente* between the school and the employer. And finally (but here we enter the region of pure hypothesis and conjecture) such a state of things may develop in its turn into some sort of system of municipal apprenticeship.

Mr. D. Milne Watson, M.A., LL.B. (the General Manager of the Gaslight and Coke Company), followed with a paper on the same subject; his object being to give some information as to co-operation between employers and the educational authorities as exemplified in his Company. It had, he said, to be recognized that, owing to the early age at which boys left the elementary schools, the education they acquired was very limited in scope. Without wishing to under-estimate the value of the work done in the elementary schools, it would be admitted that much more was necessary before a boy was fit to earn his livelihood in a skilled trade, and to rise in that trade to a position of trust and responsibility. The school could not be expected to supply the highly specialized training necessary in individual trades to-day; and it was the duty of the manufacturer to give the lads who entered his business the practical training necessary to make them good workmen. It was also necessary that the staff who were already competent should be kept abreast of all the most recent discoveries in the trade, not only for their own sakes, but for the sake of the business with which they were connected, and also for the benefit of the public whom they served. He would endeavour to show briefly what had been done by the Gaslight and Coke Company to solve these problems. Many inventions were brought out which made gas appliances more complex and adjustments and fittings more technical; and this naturally necessitated the higher education of the workman. It was to Sir Corbet Woodall, the Governor of the Company, together with the co-operation of the Directors, that the complete scheme of education which the Company had now established for its staff was due. Though the Company possessed a large staff of competent foremen and workmen, yet, as the work of supplying the requirements of the public began rapidly to increase, it was found necessary to enlarge the staff, and to provide a course of training for boys just leaving school, and thus secure a body of competently trained workmen for the future. Mr. Milne Watson then gave details of the scheme

somewhat on the lines of those contained in the paper read by Mr. Goodenough before the Institution of Gas Engineers in June. It is unnecessary to repeat these particulars now; and we will content ourselves by giving the author's conclusion.

Dealing with the subject generally, the system the Company have inaugurated has had this additional advantage—that it has revived interest in the technical school. It used to be said by those who were asked why they did not attend technical classes that they had enough gas during the daytime, without wanting to study it at night. The reason was not that they were tired of their work. A man never is. He is always talking about it, even if only to discuss it with his wife or friends. The real reason was that they saw no connection between the technical institute class and their daily work. The Company have changed all this. A man realizes that if he wishes to rise in the Company's service he must equip himself with the best knowledge available; and this knowledge and instruction he finds in the technical schools. So for the first time his interest in them is awakened, and he sees that practical work during the day and theoretical instruction in the evening are equally valuable as helps to progress.

I have endeavoured to give an account of the training given by the Gaslight and Coke Company, and of the educational ladder by which the staff may climb from the lowest to the highest positions. Interest in such a scheme is not, however, merely local, or confined to one industry only. All over the world we see a great movement in operation. Old methods are passing away, and new and improved means of production are taking their place. How is this movement to be successfully dealt with, and how are manufacturers to keep pace with other countries? The answer is, By being fully equipped with the most modern forms of machinery, and with the best business methods. But this is insufficient without trained men. This cannot be left to chance. The staff must be carefully trained, if the machinery is to be used to the best advantage; and I feel sure that the results obtained by special education amply justify the time and money spent upon it.

Compare the boy who is trained as I have described—one who has a pride in his work and a real knowledge of a craft—with one who has been allowed to pick up information anyhow. The one can go all over the world and earn a good wage; the other is, as a rule, among those who are only tolerated by an employer, and who are discharged first when work is slack. The one has been trained in methods which make him careful, correct, thoughtful, and as useful a man in the affairs of the world as in his work; the other is too often as slovenly a citizen as he is a workman. Surely this is worth a little trouble on the part of employers, and was never more necessary than at present, when this country is face to face with international competition in every trade.

In this direction lies the way to success for the old country, whose workmen are probably the best in the world, if only they get a fair chance and are properly trained; and, without fear of contradiction, I say that one of the greatest duties of all employers of labour is to see that their workmen receive adequate training.

Mr. F. W. Goodenough said one could only hope that the papers would help to arouse the employer to a sense of his responsibility; for in education, as in other industrial matters, revolution or evolution must come from the better-educated classes. A point which would appeal to employers was that there was money for them in the better education of their staffs. Mr. Milne Watson would agree with him that this had been the Gaslight and Coke Company's experience.

Mr. W. E. Price (Hampton Wick) remarked that much had been said about the boy of the better class; but what about the labourer? There were a very large number who had gone out into the world at early childhood without any particular care being taken of them; and these, he believed, represented the discontent which existed in the labour world.

Mr. H. M. Thornton suggested that manufacturers throughout the country should combine to form an association, and periodically discuss matters relating to them as manufacturers, apart from any particular industry. Mr. Milne Watson's paper was a practical example of what could be accomplished by the application of education to industry.

Mr. Cloudesley Brereton, in reply, dealing with the question as to what was to be done with the unskilled, said it seemed to him that one must first organize the education of the skilled, not neglecting the unskilled altogether. The reforms would have to come by gradual organization and attention to each trade and group of trades; and in this way he hoped ultimately there would be no unskilled people left. This, however, was an ideal. He saw no reason why the valuable suggestion as to a permanent association of manufacturers should not fructify. Congresses of employers every year would undoubtedly have a tremendous effect in solving the problems facing them.

Mr. Milne Watson also strongly supported the suggestion in regard to an association of employers. He thought it would do far more good than having a £50,000,000 guarantee fund, and not lead to so much trouble as this fund was likely to.

A hearty vote of thanks was accorded the authors.

NATURAL LAW IN THE COMMERCIAL WORLD.

Mr. A. F. Sheldon contributed the last paper, which was full of good sayings. The writer expressed his belief in the existence of natural laws, and discussed some of these laws, as he sees them, as related to the commercial world, in the hope that what he had to say might prove helpful in the solution of the difficulties which now confront the commercial world. Not only were there difficulties to face, but real dangers. There is, he said, nothing unreal about the unhappy relationship which now exists between capital and labour, taking world conditions as a whole. A very bad effect is rampant in the land, and every effect has its cause. Future generations will consider present commercial conditions as unfit for human beings to endure. Both America and England, as far as the classes are concerned, seem to be strongly indifferent, almost apathetic, to existing conditions. Of the people of the world, 95 per cent. are employed by the other 5 per cent.; and the 95 per cent., taken as a whole, are restless and becoming more so. The sea of humanity, made up of the 95 per cent., is gradually being lashed into a storm. Certain men in the gas industry of England are not standing idly by. They are doing something to steer their particular ship of commerce to the harbour of profit-sharing. In this and other ways, members of the 5 per cent. (the employers of the world) are bringing their commercial operations into harmony with some of Nature's laws. Thus do they help to pour oil upon the troubled waters of the sea of labour in general, as well as to guide their own ship to safety. But unless more of the 5 per cent. join, and speedily, in an effort toward betterments in business, a storm will break which will ruin many, and hinder the progress of all. Possibly we should state that the attitude of the majority of the 5 per cent. may be more accurately described as being that of inaction rather than indifference, and that their failure to do anything to bring about a better condition is not so much a fixed belief that there is no remedy, as lack of knowledge as to what the remedy is. The crimes of labour against capital and of capital against labour—and there are crimes on both sides—are each and all due to man's ignorance of the natural laws of successful conduct.

The basic law of all, continued Mr. Sheldon, is the law of service. Among the 95 per cent., few seem to have perceived the truth that service rendered is cause, while pay or reward obtained is effect. There are millions of men ruining their eyesight looking for more pay. If they would seek as diligently for more and better ways of rendering service, the more pay would look after itself. The man who is always willing to render all the service he can, regardless of the amount received, finally comes to a point where it is possible for him to be paid something for the work which he does in the way of inspiration, instruction, and direction of the work of others. You cannot keep a good man down. There is plenty of room at the top; and the reason is that so few men see with clearness the law of service. The employer who unjustly withholds proper reward from him who has rendered good service is guilty of a violation of natural law. Thousands of employers studiously keep their people as far as possible in ignorance and fear. They not only do nothing to uplift and enlighten those upon whom the existence of their business depends, but studiously bar any attempt in this direction by others.

Considering what service is, the author said that the commercial success of a gas company, or any other house engaged in commerce, is in direct proportion to its exercise of the art of securing permanent and profitable patrons or customers. To keep a customer satisfied, the seller must so conduct his business with him that he keeps his confidence. By the company fulfilling the law of service, the customers are willing to pay the right reward to their servant (the gas company); and it is perfectly right that the gas company who give good quality, good quantity, and good mode of conduct should make money. Many employees have dimly or clearly perceived the law of service, and are applying it. Such employees look well to the quantity and quality of their service, and to their mode of conduct towards the employer. But where there is one who does, there are many who do not; and thus is the effort of the faithful and efficient few largely nullified. Do you, asked Mr. Sheldon, realize that the true function of the 5 per cent. (the employers of the world) is that of "teachers?" Are you giving to those in your employ the educational guidance necessary to uplift and upbuild and to make them healthier in body, mind, and soul? Are you manufacturing man-power and more of it in your house of commerce as the days and weeks and months and years roll by? Are you, as leaders of men, setting the right example to your men? Men at the top must learn the great law that "to get one must give." Learning and love are alike in this, that the more one gives the more one has. To get of love and of loyalty and of enthusiasm and all those other qualities which, combined, make human efficiency, one must give freely of them and of learning concerning them. Oh, yes. I know full well the ingratitude of men. Examples are plentiful where men at the top have tried to do for employees, in the way of welfare-work in various forms, only to have it seem like worse than wasted effort. But the secret lies largely in the spirit and the manner in which the welfare-work is done. If the spirit is wholly mercenary, purely commercial—if the men at the top do things toward bettering conditions, solely for the purpose of gain—then the greatest possible gain cannot come. Do the finer and better things, because it is right that you do them. Take a real interest in your people, and then keep at it, not being discouraged if the first attempts seem fruitless, and then results will be bound to come.

Until such time as our school systems are radically revised, each commercial house must have classes of its own. Many of our greatest commercial houses are vast schoolrooms, and those engaged in the service of them are constantly and systematically improving themselves. Then how can an employer render just reward to the employee? Profit-sharing is evidently among the

most, if not the most, practical solution of the financial side of the problem. "Scientific management" offers suggestions and possible solutions. Welfare work, in its many phases and adaptations, points the way to the service from employer to employees in matters other than that of monetary reward. Next, how can the employee render better service to his employer? His first step, once having seen the law of service, and having kindled the desire to increase his service-rendering power, is to realize that there is a vast difference between the desire to render service and the capacity to really render it. He must recognize the fact that commerce is a profession worthy of the best of talent. He must quit wishing for success, and do something to fit himself to deserve it. All too many have a wishbone where the backbone ought to be. To render an increasing degree of service, he must obey four basic instructions. First, he must know himself and how to develop his efficiency qualities—functioning in, first, wise discrimination as to deeds done and words spoken; second, the ethical sense; third, accuracy; and, fourth, speed. At the back of these characteristics is the whole list of qualities which, developed, make for service-rendering power. He must know the other man, know his own business, and apply his knowledge of himself, the other fellow, and his own business to the end of creating satisfaction, confidence, favourable attention, interest, desire, and action in the minds of those with whom he comes in contact. Let us all, employers and employees alike, unite and shake hands, and try the way of service each to the other.

A vote of thanks was passed to the author, at the conclusion of the reading of the paper; and Mr. Sheldon briefly acknowledged the compliment paid to him.

CONFERENCE OF MANUFACTURERS.

THE final conference arranged in connection with the exhibition was one for manufacturers; and it took place on Wednesday. The chair was occupied by Lord WEARDALE, and four papers were presented, some of the information contained in which is given here. Mr. F. W. Goodenough said he had received letters of regret at inability to attend from the Lord Mayor, the Lord Mayor-Elect, and Sir William Mather.

Lord WEARDALE, in opening the proceedings, said that it had recently been pointed out by those responsible for the policy of the gas industry that it was now recognized, whatever had been the case in other days, that, being entrusted by Parliament with a monopoly, the industry had thereby had imposed upon it the duty of giving the best possible service in connection with the supply of this monopoly—relying for its prosperity, not upon monopoly rights (which, after all, were open to the competition of other sources of light, heat, and power), but upon good value given. It was in pursuance of this policy of advising and consulting with their customers, and doing all in their power to promote economy and efficiency in the use of gas, that so many conferences had been held at the exhibition, of which the present one was the last. For himself, he only had one excuse to make for presiding, and that was that, although he had to-day no immediate connection with the gas industry, he was for many years associated with the Welsbach incandescent light.

THE INDUSTRIAL USES OF COAL GAS.

Professor WILLIAM A. BONE, D.Sc., Ph.D., F.R.S., contributed the first paper, which, though specially referring to coal gas, contained also facts and figures relating to other gaseous fuels available for industrial purposes in Great Britain—such as the surplus gases obtained from blast furnaces and coke-ovens; producer gas generated under various conditions, with or without ammonia recovery; and water gas.

In considering the place of coal gas in the industrial field, he said it should be recognized that its chief usefulness will be more in the direction of supplying the manifold wants of innumerable but, relatively speaking, small consumers (which in the aggregate constitute a very large proportion of the total demand), than in meeting the requirements of the fewer large establishments, whom it will probably always pay to generate their own gaseous fuel. Though the economy of a rich gaseous fuel such as coal gas over coke or raw coal is, from the standpoint of the small consumer, not merely a matter of its price (because, of course, a great many other elements enter more or less directly into the final cost-sheet), yet its price will always be an important element. In the public interest, not only should every effort be made to reduce to the lowest point the costs of the manufacture and distribution of coal gas, but the short-sighted policy adopted by many municipalities of taxing the gas consumer in order to show a large profit on the municipal gas-works, ought to be abandoned. The conference should make it known that, in the case of municipally owned gas-works, manufacturers expect to be supplied with gaseous fuel at little more than the bare cost of manufacture as ascertained on any sound financial basis—*e.g.*, carbonizing and distributing costs, salaries, rent and taxes, interest and depreciation, sinking fund charges, &c.—and that they do not see why gas consumers should be singled out for special taxation to relieve the rates.

For the purposes of his paper, continued Professor Bone, several of the largest gas-making concerns, both municipal and company owned, had furnished him with detailed information as to the prices at which they supply gas to large consumers for industrial purposes. He set forth what is being done to encourage industrial consumption by the Gaslight and Coke Company, and Birmingham, Sheffield, and Glasgow. In the area of the first-named Company, varying discounts of from 15 to 25 per cent. for industrial and power supplies, bring the rate of a consumer taking upwards of 1½ million cubic feet per quarter down to 1s. 6d. per 1000 cubic feet. During the year ended March 31 last, in Birmingham no less than 1900 million cubic feet of gas (or 22½ per cent. of the total output) was sold for industrial purposes, at an average price of 1s. 3d. per 1000 feet. A consumer taking more than 4 million cubic feet a quarter would have paid only 11·4d. per 1000 cubic feet. In Sheffield, a manufacturer who uses over 500,000 cubic feet per annum is charged 1s. per 1000 feet for all gas in excess of this amount; and for anything over 6 million cubic feet per annum he has to pay only 10d. per 1000 cubic feet. Thus a consumer of 10 million cubic feet per annum pays an average price of 11·37d. per 1000. One industrial establishment alone uses 15 million cubic feet per annum in connection with the manufacture of agricultural implements. The Glasgow Corporation Gas Committee, in the year to May 31 last, supplied about 363 million cubic feet of gas for manufacturing purposes (excluding 344 million feet supplied for gas-engines), or about 5 per cent. of the total gas sold in the year. Practically 80 per cent. was sold at either 1s. 5d. or 1s. 6d. per 1000 feet. Having regard to what is being done in these places, the author said it is disappointing the gas authorities of such cities as Liverpool, Manchester, and Leeds are making little or no effort to stimulate the industrial use of gas by concessions to large consumers. The Liverpool United Gas Company charge a flat-rate of 2s. 1d. per 1000 feet, with no reduction for large industrial consumptions; the Manchester Corporation Gas Committee charge 2s. for consumptions of upwards of a million cubic feet per quarter, less 2d. per 1000 feet for payment within a month; while I am informed that in Leeds "the question of allowing rebates to large consumers is at present receiving the attention of the Committee."

After briefly setting forth the advantages of a gaseous fuel such as coal gas over raw coal or coke, the author proceeded to mention, by way of illustration, a few of the more important purposes for which coal gas is now being used on a large scale in industrial establishments. In metallurgical applications, there are the melting of aluminium, brass, and various alloys in crucible furnaces, the melting of standard gold and of silver, and the hardening, tempering, and annealing of special steels (including tool steels). There are also the melting of lead and type metal, japanning, applications in connection with the glass and textile industries, and steam raising.

The Birmingham Aluminium Castings Company, Limited, Professor Bone understands, melt the whole of their aluminium alloys in 160 lb. charges in crucible furnaces using high-pressure gas; finding reduced melting costs, less loss of metal by oxidation, and greater tensile strength in the resultant alloy. Brass melting is also carried out with equally satisfactory results. Some few years ago, the authorities at the Mint decided to investigate the use of gas and oil in bullion melting; and ultimately, in the early part of 1910, four gas-fired furnaces were installed for melting standard gold, fitted with special burners designed by Mr. S. N. Brayshaw, of Manchester. From May 23 to Dec. 31, 1910, 283½ tons of standard gold were melted in them. The economies realized over the old coke-fuel furnaces were: (1) A reduction of fuel costs from 7d. to 4½d. per cwt. of metal melted; (2) 50 per cent. longer life of the crucible; (3) the doubling of the melting capacity of each crucible, without any alteration in the furnace dimensions. These satisfactory results with gold induced the authorities, in the year 1911, to instal in the new silver-melting house sixteen gas-fired furnaces, each capable of taking a 400-lb. crucible.

Gas-fired furnaces are, continued the author, now largely employed in Sheffield and Glasgow for the hardening, tempering, and annealing of special steels (including tool steels), and for file forging. The importance of accurate temperature control in all such operations can hardly be exaggerated; and it is no wonder that gas-firing is rapidly superseding all other methods. The common size of annealing furnace used in Sheffield is one of internal dimensions 15 ft. 9 in. long by 2 ft. wide by 1 ft. high, and is capable of holding over 2 tons of bar steel. Over forty such furnaces are now working in Sheffield; and it is stated that the cost of gas (reckoned at 1s. per 1000 cubic feet) is about 4s. per ton of bars annealed at a temperature of 770° C. Incidentally, the total time occupied by the whole sequence of operation—charging, heating, cooling, and unloading—is only 48 hours, as against a minimum of 72 hours for a coal-fired furnace.

As to the melting of type metal in connection with the printing trade, one of the leading London daily papers requires 20 tons of

molten type metal continuously at hand during sixteen out of the twenty-four hours. By means of the new process of "surface combustion," it is possible to melt a ton of cold lead, and tap it at a temperature of 372° C., in a continuous apparatus, using only 200 cubic feet of gas. This represents a thermodynamic efficiency of about 80 per cent.

With regard to steam-raising, Professor Bone said there are many industrial establishments which, though not relying upon steam for their motive power, yet must of necessity use steam in perhaps relatively small quantities in connection with some special factory operation. It may be that steam is not required continually, or for very long periods; so that rapidity of generating steam from a cold-water supply is of importance. I venture to think the gas industry might well adopt a more aggressive policy in this matter. In this connection, I may perhaps here mention that the Bonecourt gas-fired "surface combustion" boiler will, in conjunction with a feed-water heater, transmit 93 per cent. of the net calorific value of the gas to the water. We have installed several very large boilers for coke-oven and producer gas, and are able to construct quite small boilers, evaporating (say) 100 to 1000 lbs. of water per hour at any required pressure, for use with coal gas in small establishments; and we can confidently guarantee an efficiency of over 90 per cent. on the net calorific value of the gas. One important feature of the new boiler is that steam can be raised at the required pressure within thirty minutes from an all-cold start; and the rate of evaporation is just double that of a locomotive boiler.

As soon as a manufacturer has decided to introduce gas heating for any particular purpose into his factory, he should forthwith confer with either the local gas manager or with some firm of furnace-builders. The Corporation Gas Departments of Birmingham, Glasgow, and Sunderland, as well as the Sheffield Gas Company, have shown considerable enterprise and foresight in fitting up and maintaining large demonstration laboratories and foundries, in which the latest developments in heating appliances can be seen at work, and where the would-be consumer can obtain expert advice, and (if necessary) make actual large-scale tests. The Gaslight and Coke Company will shortly have a similar demonstration station in London; and doubtless most of the other large gas concerns will soon follow suit.

Turning from the present to the future. The experience of the past twenty years in connection with the development of gaseous fuel of all kinds enables one to predict with considerable confidence the approaching time when gas of one sort or another will have practically ousted raw coal in most industrial operations. It may be gas generated from coal or coke at or near the place of consumption, or it may be gas distributed from some central generating station. It may be coal gas, coke-oven gas, producer gas, or blast-furnace gas. But however it may be generated, or by whatsoever name it may be called, it will be gas, and not coal, which will be burned in our furnaces and boilers. Further, I think that it will be washed, and perhaps also purified, gas, because accumulating experience in the iron and steel industry shows that it pays in the long run to use a "washed" gas. I hold no special brief for the coal gas industry, although I am glad to co-operate to the fullest of my powers with all those who profess the true faith in gas. There are certain fields which will continue to be monopolized, as they are now, by cheaper forms of gaseous fuels, generated on the spot. There may also in future be competition with "ammonia recovery" producer gas distributed from central generating stations. But there will always be a large and ever-developing field for Murdoch's gas.

May I, before concluding, put forward two suggestions. I have been greatly impressed with the industrial possibilities of high-pressure distribution. My friend, Mr. George Helps, of Nuneaton, who was the first to instal the system in this country, informs me that the cost of a high-pressure main for distributing a given amount of gas over a given distance is less than one-third that of laying a low-pressure main of similar capacity; and this I can well believe. High-pressure gas also has the great advantage of securing to the consumer, not only constancy of pressure, but, what is equally important, the possibility of a wide range of pressure at command. If gas could be distributed through "primary" mains, with welded joints, at (say) 200 lbs. per square inch pressure, and then be governed-down at the place of consumption, it would pay, not only to distribute both high-grade and low-grade gaseous fuels, but also to mix them in suitable proportions for specific purposes. Thus, for example, at the Skinningrove Iron-Works, washed blast-furnace gas of a calorific value of less than 100 B.Th.U. per cubic foot, is being enriched by admixture with coke-oven gas of a calorific value of 500 B.Th.U. per cubic foot in such proportion as produces a mixture of a calorific value of 180 B.Th.U. per cubic foot. The mixture is then used for firing soaking pits, and large open-hearth steel-furnaces. And there may be manufacturers who, having no coke-oven gas at command, might, if coal gas were available at anything like 1s. per 1000 cubic feet, buy it to mix with some cheaper low-grade gas for special purposes. But, in any case, high-pressure gas itself offers advantages in regard to economical and intensive combustion, in addition to greater constancy and elasticity in pressure, which the consumer ought to have at his disposal.

My second suggestion (which I hope you will all endorse, if you cannot my first) is this: Let the gas-making authorities turn out calories in the form of gas at the cheapest possible rate, so as to induce business, and let the manufacturers use more gas, so that the gas-works can make it still cheaper. It is quantity that tells. The more we use, the more must we make; and the more we make, the less it costs to make it.

Mr. H. M. Thornton, in proposing a vote of thanks to Professor Bone, remarked that, as he had expressed in his own paper before the British Commercial Gas Association, he did not think the gas industry or the industrial world had realized as fully as would be done in the course of a few years the extraordinary value of coal gas for the advancement of their industrial prosperity. It was essential to settle down to some fixed and definite policy of demonstrating the various industrial applications of gas to the general public, and to users and possible users of gas. He could think of nothing better than what he had already suggested in his own paper, which was to have central demonstration-rooms such as were now being opened by large gas companies and corporations. In addition, they must have specialists dealing with this great work, probably in regard to the smaller undertakings through the agency of the British Commercial Gas Association. Something in this direction was now being done largely by the manufacturers of appliances; but personally he did not think these were the people to do this sort of thing entirely. Manufacturers would share in it by collaborating with specialists from the gas departments; but they should not have the onus put wholly upon them of tackling the subject. In the case of his own firm, they had not only specialists, but at least six special men, under the head man, who were constantly in all parts of the country advocating industrial gas, and showing its possibilities and economies in all directions.

Mr. G. Shaw Scott, who seconded the vote of thanks, regretted that Professor Bone had not said more about his own system of surface combustion, in which, they had been told, there was a steam-raising efficiency of 93 per cent. This was a most marvellous achievement, as it was no less than 25 per cent. greater than the efficiency obtained when using coal. As Secretary of the Institute of Metals, he had a good deal to do with the question of melting aluminium, gold, and other metals; and he quite agreed that for this purpose gas was essentially the best medium to use. Incidentally, he mentioned that the Metallurgical Department of the Birmingham University had a very complete gas equipment for melting all classes of metal, and also that the Birmingham Corporation had been one of the pioneers in establishing a demonstration-room where manufacturers could see what was being done. The Corporation, also, had been one of the pioneers in the introduction of high-pressure gas.

Mr. F. W. Goodenough agreed that they had yet to realize the full extent to which gas played a part in their daily life. He did not think that either Mr. Thornton or Professor Bone had referred to the use of gas for heating incubators or for the heating of crematoriums; but he believed it was employed for both them purposes. He could not help feeling that Mr. Thornton's paper, followed so soon by Professor Bone's, would do a great deal to make manufacturers realize the possibilities of gas as an industrial fuel. It was one of the pleasures of being connected with gas manufacture to feel that it was an industry which had managed to eliminate waste altogether, because there was nothing which annoyed a man of an economical frame of mind as waste of any description.

The vote of thanks having been carried,

Professor Bone, in reply, remarked that he had not said much about the system of which he happened to be the inventor because, to be quite frank, he did not think it altogether fair for a man to come before an audience of this sort on an occasion of this character to boom himself. It was for this reason that he had only incidentally referred to his system. He had, however, been invited to lecture at the Royal Institution at the end of next February, on the subject of surface combustion; and he hoped by then to have a good deal to say about more recent developments, which he was sure would interest everybody.

THE ECONOMIC VALUE OF ADEQUATE ILLUMINATION.

Mr. Leon Gaster (Hon. Secretary of the Illuminating Engineering Society) dealt with the value of good lighting on economical grounds. Referring to statistics of factories, he said these seem to show that there are defects in the use of artificial lighting that lead to accidents; and these defects should be traced and removed. He had offered the suggestion that insurance companies should make a practice in the future of granting more favourable terms to all manufacturers whose premises are particularly well illuminated, and increasing the rate for those which are badly lighted. Further as to economy, he pointed out that imperfect illumination is one of the most potent causes of fatigue, and that measures to remove this defect are well worth consideration. Good lighting should have an important influence on the output, besides improving the quality, of the work. In fact, there would be certain trades in which the percentage of spoiled work attributable to poor lighting would be very much more than 1 per cent. Mr. Franklin Thorp, in his paper,* gave it as his opinion that the cost of proper lighting in the Lancashire mills was usually a very small proportion—sometimes less than 1 per cent.—of the wages bill. If, therefore, by introducing improved lighting, a gain, in output or quality of as much as 2 per cent. only were made, this would well repay the expense of putting the lighting on a proper basis. Dealing with the chief requisites of illumination, the author remarked that the establishment of standards of illumination for various processes, besides assisting the authorities to induce

* See *ante*, p. 222.

manufacturers whose shops are at present insufficiently lighted to improve their lighting, would in many cases prevent waste and render possible a saving.

On the subject of the best means for spreading broadly the results of good industrial illumination, so that the experiences in this respect of the most progressive manufacturers may become more general, Mr. Gaster said: Data as regards the illumination provided in foot-candles are very useful to the lighting engineer, and as records. Yet they are open to the objection that they do not as a rule appeal to the manufacturer. Some other method of presenting results, showing the practical gain secured by improvements in lighting, is really needed. A method recently described by Mr. Thurston J. Kent deserves notice. He suggests that the various processes should be accurately timed, first with the old illumination and then with the new; so that the exact commercial value of the increased output or improved quality, or both, following the change could be traced, and the result brought home to the manufacturer in £ s. d. If applied with care, this method should enable interesting results to be secured; and it would also be valuable if a record could be kept of the percentage of spoiled work before and after installations were changed. Unfortunately, even when such results are obtained, it is not easy to induce manufacturers to make them public. Still, if these methods became common, there would doubtless be many cases in which publicity would be allowed, and the accumulation of such data would supply sound arguments and facts to those striving for improvement in industrial lighting. But for their own sakes, I would therefore urge upon manufacturers the desirability of obtaining such records. Already artificial light, by enabling work to be proceeded with when daylight has passed away, is proving an invaluable aid to the manufacturer. Yet, while much care is expended on the planning of factories so as to have maximum window-space, the artificial lighting is but rarely planned out in a scientific manner. I believe that in years to come the immense economic importance of light will be recognized far more fully than to-day, with the result that the illuminating apparatus and the machine to be illuminated will be regarded as one unit. It will be considered as absurd to scheme out a factory without considering the artificial lighting, as it would be for an architect to plan a building but leave out of account the windows.

Mr. A. J. Whyte (of the James Keith and Blackman Company), in moving a vote of thanks, complimented Mr. Gaster on the good work he has done for many years in connection with the Illuminating Engineering Society. One point in connection with the lighting of factories was that up to now it had been more or less done, not on the foot-candle basis, but on a common-sense method of fixing the lights where they were required, after a careful study of the conditions of the factory. He must say that he preferred this method, though, of course, if science could be allied to common-sense in the matter, a much better result might be obtained. Again, if the lighting installations were not kept in good order, and maintenance looked to carefully, the whole question might as well be left alone. It was well known that the Gaslight and Coke Company had a maintenance department, which did its work admirably; and there were other companies in London and the provinces who did the same. If he might be allowed to mention it, there was a point as to the attitude obtaining in the electric supply industry with regard to the current necessary to supply motors for driving gas-compressors—difficulties being put in the way in the matter of price.

Mr. J. W. Glover seconded the vote, and said that his long experience with factories, extending over half-a-century, had convinced him that the value of a good light for securing the health of the workers, and also improving the production and bringing about good work, could not be over-estimated. He agreed with the desirability of properly arranging and shading the lights, and also of having a maintenance staff where the installation was large enough. In connection with one remark in the paper, that weavers in Lancashire mills often left one to go to a better-lighted one, he might mention that he would shortly be rejoicing in the jubilee of one of his men, which seemed to indicate that at any rate the textile industry was not the only one which could keep its men for long periods.

Mr. F. W. Goodenough, dealing with Mr. Whyte's remark as to the supply of electricity for gas-compressor motors, said it was desired to keep the conference free from such controversial points; but it was a fact that the electric light companies charged high prices for current for this purpose. Personally, he regarded it as a very excellent testimonial to the effectiveness of the competition of high-pressure gas, because if the electric supply companies did not feel it was a dangerous competitor, they would not put artificial obstacles in the way. It was not, perhaps, quite "cricket;" but the gas industry would deal with it. He congratulated his friend, Mr. Glover, on his own jubilee, as well as that of one of his workmen. It reflected great credit on his firm that they were able to keep their employees; and he had no doubt, from what he knew of the firm, that it was partly due to good lighting.

The vote of thanks was put to the meeting and carried.

Mr. Goodenough then proposed a vote of thanks to Lord Weardale, who was unable to remain longer, owing to another engagement. This was carried with acclamation.

MATCHING OF COLOURS BY ARTIFICIAL LIGHT.

Mr. T. Thorne Baker read the next paper, which he prefaced with the statement that industrial work has been considerably hampered for many years by the difficulty of accurate colour-matching; and a movement of a serious character is on foot at the present time to overcome it. The subject is not one that can be dealt with indiscriminately. Colours are selected, on a comparative basis, by their effect on the human eye in daylight; and therefore daylight is the sole medium by which accurate colour-matching or judging can be carried out.

If, the author went on to say, we ask the question, "What is daylight?" we find that daylight is merely the illumination produced by the sun, whose rays give a white light composed of definite proportions of the elementary colours, violet, blue, green, yellow, orange, and red. Daylight contains other invisible rays—the ultra-violet and the infra-red; but as far as colour-matching by the eye is required, these do not concern us. If, then, we take any artificial light, examine it, and determine the relative proportions of its constituent colours, and subdue those which are predominant, compared with the proportions of such constituents in daylight, we shall be able to produce an illumination like daylight, which is, in the physical sense, and as far as the human eye is concerned, the same. Any colour-matching we do, therefore, in this artificial daylight will be as satisfactory and as accurate as if we had carried it out in daylight. Hence for industrial work—for the lighting of studios, and so on—the production of such a light is of great importance. We shall now see in what way the light produced by incandescent gas-mantles can be modified or treated in order to produce this desirable effect. Before attempting to control or correct any source of illumination, we must first be able to make accurate comparisons of it against some acknowledged standard—in our case, of course, daylight. The spectroscope is an instrument which enables us to split up white light into its constituents, when we find that the violet at one end of the spectrum gradually emerges, with complete continuity, through all the colours, until it dies away in the deep red. Each colour has not the same brightness to the eye. The greenish-yellow portion of the spectrum is the brightest, the green and orange portions less bright, the violet and ruby portions are quite dim by comparison, and so on. Now, any illuminant that we choose must, in order to resemble daylight, possess the same relative brightness of each individual portion of the spectrum. For ideal illumination from the colour-matching point of view, we must take ordinary daylight. Here, again, we must make a convention as to what *is* ordinary daylight, as the spectrum constituents of sunlight under different conditions vary to quite a surprising extent. The light reflected from white clouds is the best and most satisfactory to adopt as an actual standard.

Mr. Baker then described, by the aid of some lantern slides, two methods by which the light of artificial illuminants can be compared with daylight—the photographic method, which is useful for purposes of direct record, and the spectrophotometric, which is ideal from the qualitative as well as the quantitative standpoint. From the point of view of colour-matching, he explained, incandescent gas is not very far from perfect in itself, and can with little difficulty be so screened as to give an illumination suitable for the examination and comparison of colours with very fair accuracy. The nicest and most convenient way of making optical comparisons of the gaslight spectrum is undoubtedly by means of the spectrophotometer. This is an instrument, essentially a spectroscope in the first place, by which we can see in the eyepiece two spectra simultaneously, one above the other; and by means of a shutter in the eyepiece we can divide off one narrow region at a time for comparison. Suppose we examine a particular region, and find that one illuminant is here brighter than the other. Means are provided, either with a grey glass wedge or by means of crossed Nicol prisms, to damp-down the luminosity of the brighter spectrum until the two appear of equal brightness. By passing through the entire visible spectrum bit by bit, in equal regions, and noting the damping-down necessary to obtain equal luminosity in each case, and plotting-down these extinction coefficients against wave-lengths, we again have a curve of comparison of one illuminant against another.

It will thus be seen that means are at our disposal accurately to compare incandescent gaslight with daylight, or with any other illuminating source; and once we have this means in our power, it is obviously a straightforward matter of experiment to prepare a light filter or screen which will give to the filtered light a spectrum equivalent for all practical purposes to that of our standard of white cloud light. A rough diagram shown on the screen gave an idea of the problem. The top curve showed the spectrum luminosities measured for the different regions of the spectrum of daylight, and the second curve the spectrum luminosities for a hypothetical artificial light. Subtracting the luminosities, measured as ordinates, of the first curve from the second, there is obtained a third curve, which shows the difference between the spectra of the two illuminants. The third curve shows, in fact, what one must subtract from the artificial light to make it equivalent to daylight. If, therefore, there is made a light-filter of which this represents the absorption curve, and the artificial light is screened through it, there will be produced artificial daylight illumination.

In order to find out how to colour the filter, a simple, but careful, laboratory test has to be made. The procedure that I always adopt is to take a flat glass cell of known width, filled with water; the surface area of the flat sides being measured. We will suppose the cell is ½ inch wide, and the surface of the water on each side of the flat cell 4 square inches. We now take one, two, or three burettes, or as many as may be necessary, and fill them up with solutions of the necessary aniline dyes. By adding the dyes

very carefully to colour the water in the cell, until on spectroscopic comparison through it of the artificial illuminant we get this equal to that of daylight, we produce the requisite filter. [I have called this a simple experiment; but it is not always a short one. Considerable care must be exercised in carrying it out; and good instruments must be employed in the spectroscopic determinations.] Having now produced a liquid cell which will screen-out the necessary rays, we can make either a large liquid filter, or stain a glass sheet coated with gelatine to make a dry filter. In the latter case, we must employ specially purified gelatine, and optically flat glass so as to get the best results; and the fact that the dyes when dry often give a different absorption spectrum than when dissolved in water, has to be taken into account. The illumination given by an incandescent gas-mantle lends itself particularly well to filtration in order to give "daylight;" and the work is minimized thereby. The spectrum is very even; and we merely find the blue-violet deficient, and the apple-green part of the spectrum predominant. The blue-violet can be enhanced by means of a blue-violet dye in the filter; and the green rays may be subdued partly by means of this dye and partly by means of a suitable red dye.

Describing a form of lamp suitable for use in testing or colour-matching rooms, which can be made at quite a low cost, and will illuminate the table or bench with "daylight," Mr. Baker said the filter is inclined slightly; and the reflector is parallel with it. This enables the lamp to be attached to the wall above the table, and the filtered illumination is thrown down upon the latter. In order to obtain better diffusion, it is desirable to have a piece of ground glass placed in contact with the light filter. But this unfortunately still further diminishes the power of the light; and as most ordinary glass has a very decided spectrum absorption of its own, a piece of particularly white glass must be chosen for the purpose, and ground specially. Another method of obtaining "daylight," which is suitable for use on a more extended scale, is by having the lamp placed fairly high up, near the ceiling, and large opal or enamel white reflectors placed beneath, so that the room illumination is reflected downwards. The ceiling, instead of being white, must be painted or distempered with the requisite colour to function as an absorption filter. In such cases as this, purity of the artificial daylight is more difficult to obtain; but the method is useful for general illumination.

In all cases where light-filters are employed, the deterioration due to the heat of the gas-burner must be taken into consideration, and carefully watched. When a suitable filter has once been obtained, one or two spare ones must be carefully put on one side, kept in a place free from damp, and used as standards with which the filters in use can be compared from time to time. Attention must also be paid to the upkeep of the gas-lamps themselves. The spectrum given by the mantle illumination is not always constant; and its state of incandescence depends to some extent upon the heat of the flames. Where accurate colour-matching is involved, the mantles should be renewed frequently. The same make of mantle must always be adhered to; and the burners themselves must be kept in a state of thorough efficiency.

Mr. J. Lovibond sent the following communication on the subject of the paper to the meeting; and it was read by Mr. Goodenough: My own work upon this subject up to the present has resulted in little more than to disclose some of the disturbing factors. The principal cause is traceable to the varying colour-ray proportions of different lights, and to differences of condition in the colour rays of the same light, and to physiological limitations of the vision itself. It may be accepted as an axiom that the colour of a substance varies with the colour of the impinging light; and as no two artificial lights are alike, it follows that the first requirement is equivalence in the light. For the purpose of colour-matching, the present method of estimating light value in candle power, based on the inverse of the squares of distance, is incomplete, by ignoring the physiological limitations of the vision, by making no allowance for variations in the penetrating power of different lights, and by not dealing with colour variations. In order to meet some of these difficulties, I use a photometer 30 feet long; the traveller being fitted with an optical arrangement commanding a view of the reflecting surfaces in such a way that the light intensities can be recorded in the number of units required for total absorption at any distance from the source. Then, by making measurements at foot intervals, a curve of physiological intensities for increasing distances is established in light units of a mechanical scale, which has no relation to the candle-power scale based on the inverse of the squares of distance. By means of this and accessory apparatus, the colours of direct sunlight and of artificial lights are separable into two varieties, which, for present purposes of differentiation only, may be termed superficial and latent. The superficial ones are the colours of every-day life. These are all amenable to analysis, and can be quantitatively measured for record and for recovery by a method of specific absorption. The latent colours are not so amenable to analysis, being, in fact, filtered out—that is, transmitted and made more distinguishable by the same media which absorb the superficial colours. They can, however, partially (it may even be wholly) be converted into superficial energies. The mantle is an instance; but as yet no artificial light has come sufficiently near to accord with diffused daylight. Although none of the latent colours are directly absorbable, they can be matched by some artificial lights and the colour recorded in daylight terms. These, though of different colour, are equally representative. It is, however, imperative that, in making observations, the artificial light used is constant, and the conditions of presentment similar. Variation in the angle of incidence is also a disturbing factor; the correct angle varying according to roughness of surface. For papers, powders, and such like surfaces about 60° is suitable. This narrows as surfaces become smoother, until for glazes, varnishes, highly-polished metals, &c., it reaches 90°; the governing angle being the angle of greatest absorption for the surface in question. The following measurements will convey some idea of the dimensions of the physiological light units as determined by the mechanical scale of absorbents:—

One, Two, and Three Standard Candles on a 12-Foot Photometer.

	3 Feet.		12 Feet.		Units.
One candle	28·5	..	21·2	loss	7·3
Two candles	29·7	..	21·7	loss	8·0
Three candles	31·0	..	22·0	loss	9·0

Two points worth noticing are the small increase in intensity by equal additions of volume, and the small loss in luminosity for increased distance. The foglight at Charing Cross Station was of 8 units intensity at 1 p.m. on Feb. 10, 1912. It requires a light of 31 units to read comfortably if direct, and 27 units if reflected. All colour perception is lost at 16 units of twilight. The brightest star is obliterated by 12 absorptive units. It will be recognized that the colour question is at present in some confusion; there being no generally accepted system of colour nomenclature, or colour notation. At least four conflicting theories are still being taught; and it has become a national necessity that this chaotic state of things should end. This or some other competent authority should sift the evidence on which each theory is based, with a view to a comprehensive method of studying the question. This is due to the students of the country, as upon these the future of our scientific and commercial prosperity rests.

Mr. F. W. Goodenough (continuing) said that this was a question of great importance to all manufacturers who are concerned in the production or use of coloured objects. He was speaking on the previous night to two gentlemen interested in the dyeing industry, who expressed great regret at not being able to be present at the meeting, and said that if the question of matching colours by artificial light could be satisfactorily settled, so that such an industry as the dyeing industry could be carried on equally satisfactorily by artificial light as by daylight, there would be great advantage accruing. Personally, he thought the most satisfactory point in the paper was that the difficulties in the way of this were not insuperable; and he hoped the further research which Mr. Baker was going to carry out would help in the task of arriving at an easily and economically obtained method of daylight.

Professor Vivian B. Lewes thought the paragraph in the paper which would appeal most to gas engineers was that in which the author said that, from the point of view of colour-matching, incandescent gas was not very far from daylight. It was a fact that, though it was essential for the dyeing and several other industries to have absolutely perfect light filtration, and absolutely perfect light comparison, yet for nine-tenths of the people it was important to be able to use a general method of illumination which would give as true as possible a comparison between colours. There was one suggestion he would like to make. From time to time he had carried out a large number of experiments upon incandescent light and upon the efficiency of the incandescent mantle; and they were all perfectly well aware of the fact that the light of the mantle varied to a very considerable extent. This was specially noticeable in the early days, before perfectly pure chemicals were available, and when the percentages present were not measured with the exact accuracy possible at the present time. Some of these early mantles gave blue and green and all sorts of coloured lights—*i.e.*, there was a predominance of particular rays which did not exist in the normal light. Of late years, however, the light had been gradually settling down, since it had been possible to obtain perfectly pure thoria and perfectly pure ceria. The proportion in which these were now mixed in the solution for the impregnation of the mantle was absolute definite; and the result was that the mantles had settled down to a wonderfully uniform light. In attempting to find out the secret of the incandescent mantle, he had made a very large number of experiments, which led him to think that ceria had a marvellous power of radiation—so great that it was impossible to add more than excessively minute quantities of ceria to the thoria. The addition of too large quantities had the effect of preventing the emission of rays of the right wave-length to give light. Taking a thoria mantle, and adding ceria in tenths per cent., the lighting power gradually increased; and the maximum was reached with 1 per cent. of ceria. Then there was a falling off again. This was with an ordinary non-pressure gas-burner; but he thought an advance which would very soon be made with high-pressure burners was the discovery that it was possible to put in more ceria, and that, finally high-pressure lighting would stand very nearly 2 per cent. of ceria in the mantle, instead of 1 per cent., and, what was more, the mantles would retain their lighting power far better and longer—whereas a high-pressure mantle to-day would only give its maximum power for (say) 700 or 800 hours, it would give 2000 or 3000 hours of its maximum light. This was a matter which had yet to be carefully studied and worked upon. But the point was that, as ceria was added, there was a slight alteration in the light with ordinary burners; and if more and more was added with increased pressure, it worked in the reverse direction. He

felt perfectly certain in his own mind that it would soon be possible to lay down a certain pressure for a burner with a mantle of a certain definite composition, which would give a light which was so good an imitation of daylight that it would be available for all ordinary purposes, and yet would be fairly simply reproducible. If Mr. Thorne Baker could make some experiments on these lines, it would be a valuable work.

Mr. GOODENOUGH knew a photographer who carried out some experiments to determine the relative values of different illuminants for colour-matching—for an industry not the gas industry. These proved conclusively that high-pressure gas came nearer to the daylight equivalent than any other illuminant. Those who published the report, however, were careful to leave this fact out, and merely stated what was sufficient for their purpose, that one particular type of lamp was better for colour-matching than another, using an illuminant which was not gas. They did not state anything that was not true; but they did not state everything that was true. He certainly hoped Mr. Thorne Baker would be able to carry out some experiments on the lines suggested by Professor Lewes.

Mr. LEON GASTER said the real difficulty was to determine a daylight standard, because daylight was varying from hour to hour and from day to day. There was also the difficulty that even mantles of the same manufacture varied among themselves. Nevertheless, the direction in which the author was working would undoubtedly lead to valuable results.

Mr. THORNE BAKER, in reply, said his statement that incandescent gas was nearer the daylight equivalent than any other light, must not be taken too literally. The remark was made in a comparative sense; but he had found that, where daylight was required rapidly, and it was necessary to prepare a filter on the spot, incandescent gas was the most easy to work with.

Professor VIVIAN B. LEWES, F.I.C., F.C.S., read a paper on

THE LIGHTING, HEATING, AND VENTILATION OF FACTORIES AND WORKSHOPS.

The difference in size between small rooms and large ones is a source of trouble in dealing with the hygiene, lighting, heating, and ventilation even of our homes; and when we come to attempting to deal with factories and workshops, the trouble is increased a thousandfold, as the radiant heat, which is now recognized as the only truly sanitary method of heating a dwelling-room, could never be made to warm a big workshop effectively with its large area of window space and external wall. In our homes, a room 20 ft. by 30 ft. by 12 ft. is heated efficiently by a modern gas-stove, because it forms a cheerful radiant centre round which we can gather if there is a feeling of chill; and the fact that there is a difference in temperature in the several parts of the room is itself a safeguard to health. The air is always moving, and the stagnation of air that is fatal to health is avoided. Moreover, the radiations from the fire warm the floor and the furniture; the lower portions of our bodies are kept warmer than our heads; we get cool air to breathe, and cold feet are avoided.

In the factory and workshop, on the other hand, centres of warmth are not desirable. No congregation of the workers at any point is permissible. The temperature conditions are such that when starting in the morning there shall be no risk of chill to the workers; but the temperature must never be high enough throughout the working hours to produce lassitude and fatigue. Above all, the air must be kept in motion, to prevent the emanations entangled in the clothing of the perspiring workers from blanketing the skin, and preventing the natural actions which tend to efficient work. The body will regulate its own temperature during the hours of labour, if only it is given the chance by keeping down excess of moisture in the air and at the same time keeping it moving. It must be remembered that the initial temperature required will vary with the kind of work done. If this involves great physical effort, a slight initial warming to prevent chill before the body warms itself is all that is ever needed. Any considerable continuous warming would act injuriously upon the workers; while if the work was of a sedentary character, a temperature of 60° Fahr. should be maintained.

In the past, the economy of the flueless gas-stove has been a great temptation to use it in many a crowded workshop. But though all the heat units in the gas can be transferred in this way to the air of the shop, the taint of traces of products of incomplete combustion, and the fact that the combustion of a cubic foot of gas gives more than a cubic foot of water vapour is an absolute condemnation of the practice. The amount of water vapour in a humid climate like that of this country is one of its drawbacks; and to load it further with water vapour and the other products of combustion is to reduce vitality and kill good work.

Radiant heat being impossible to obtain, convected heat is the only source of warming that can be employed for large rooms. It should be convected from surfaces at a comparatively low temperature—never exceeding 212° Fahr.; and hot-water pipes and coils, with the water circulating from a coke or gas heated boiler—the latter for preference, on account of the ease of starting and regulation—are the best method to employ. The temperature of the air should never exceed 60° Fahr.; and when it reaches 58° Fahr., there should be a thermostatic device to start fans which would keep in motion the air at the body level. If the so-called gas-radiators are used, the length of the convecting flue must be such as to remove most of the heat from the products of combustion, and then discharge them into the open air—never into the air of the workshop.

Turning to the lighting of workshops and factories, we find the same diversity of needs that makes it impossible to lay down any hard-and-fast rule for the heating. The workers in cotton-mills need a very high degree of illumination if the weavers are to do their work efficiently; while there are many other trades that require less. But it has always seemed that, no matter what the trade is, a large workshop requires two perfectly distinct methods of lighting—a general illumination that enables the whole of the floor space and machinery to be seen perfectly, and local illumination concentrated on the special work each man is carrying out. If you rely on the general scheme of illumination, the light has to be so intense and so low down that the glare wearies the eye, and no rest can be obtained for it; dark shadows are produced, and it is impossible to arrange properly the position of the light to fit all the work that is being done. If, on the other hand, local illumination only is employed, to the eye tired by the highly illuminated object on which work is being done the spaces between the illuminated zones appear to be in darkness; and many accidents happen in consequence from the dazed worker tripping over some obstruction.

With a well-lighted workshop or factory using a dual scheme of lighting, the general lights can be arranged well up above the angle of vision, while the local lights are shaded from the workman's eye, and he sees only the illumination of the object on which he is working. In such cases the general lights can be arranged equi-distant from each other, while the local lights are made to fit the special need. But if you see a workshop in which the general lighting is depended upon entirely, and the burners are arranged with mathematical exactness, you may be pretty sure it is a bad scheme of illumination. No hard and-fast position of lights is possible in most workshops; the position and intensity of the light must be made to fit the work.

There is not the slightest doubt that bad lighting means accidents, bad work, and strained eyesight. But it is undoubtedly also a fact that the more light we have the more we want; and it is a perfectly debateable point as to whether the greater and greater amount of light which we are accustoming ourselves to use is not having a serious effect upon the eyesight, and whether in days to come we may not have to admit that Nature resents excess in this as in everything else. We should never forget this, nor the fact that proper lighting is much more a question of the correct arrangement of lights than of candle power. One of the exhibits in this beautiful exhibition which must appeal to everybody is that showing the influence of the colour of the walls upon the illumination afforded by equal sources of light; and the manufacturer soon finds by experience that a coat of whitewash on his walls is a very important factor in lighting.

When we come to the question of ventilation, we are confronted by the fact that there is no more powerful engine than the flame of burning gas, and that its power of setting air in motion is one that is doing much for the health of the gas consumer. In the factory and workshop, it can be made even more efficient than in the home, as the general source of light can be a ring of inverted incandescent mantles, using either high or low pressure gas, fitted in a sun-burner case, with a tube that will bring it down to the required position in the workshop. At the ceiling level, this tube should pass inside a wider one, protected at the outlet from back-draught and open to the interior of the room. The up-rush of the products of combustion in the sun-burner tube discharging into this outer tube acts in the same way as the jet of coal gas in a bunsen burner, and sucks in air through the opening between the two tubes—thus drawing-off a large volume of air from the ceiling space, without causing too great a rush over the mantles. Fresh, cool air may then be sucked in by Tobin tubes, not opening above the head level, but about 2 feet above the floor, so that the head may be kept cool but no chill given to the lower extremities. When the gas was not alight, flues or fans would have to be used.

Where coal gas is available, there is no doubt that the heating, lighting, and ventilating of our workshops and factories can be carried out efficiently by its aid; and in future its adoption for this purpose should assist its progress in industrial districts.

Mr. T. POTTERTON said his experience had been that there was no difficulty in properly heating a small room or a large one. It was simply a question of the proper proportion of the radiating surface, and having the radiators under windows in order to get ventilation. In his house, he had adopted the plan of having 20 feet of radiation surface per 1000 feet of cube space, with proper facilities for varying the temperature of the water from 110° to 130°. He had also found it advantageous, in large rooms, to supplement the radiators by gas-fires.

Mr. F. W. GOODENOUGH said that, when referring to radiators, Professor Lewes had clearly drawn his coat-tails in front of him (Mr. Goodenough) for him to tread on; and he was going to tread on them, if he could. He always liked crossing swords with the Professor, because, though he knew he should get the worst of it, it afforded some moments of interest to the audience. Professor Lewes had pointed out what Dr. Hill had said, both at the British Association and at the exhibition, as to the fallacy of imagining that chemical purity of the air was the one and only condition to seek. Professor Lewes also joined with Dr. Hill in pooh-poohing the idea that a little CO_2 more or less in the atmosphere was of vital importance, but that what one really had to consider was

the stagnation or movement, and temperature. But immediately after saying this, Professor Lewes condemned the radiator, because it put into the atmosphere of the room in which it was used a small amount of CO_2 and moisture. What they had to aim at in life was a practical solution of problems, not merely theoretical ideals; and when one had the problem of heating a very large amount of air space, as in a big hall, then—and here he differed from Mr. Potterton—it was not only a question of taking the contents of the room that settled the problem of heating by gas. If the space between walls was very large, it was impossible to heat the compartment satisfactorily by fires situated against the walls, which would act as a conductor for the flues necessary to these fires. Once one had a big enough span of hall or shop to get out of the range of radiant heating with fires placed against the wall, it became necessary to consider the question of warming the mass of air in the room to a sufficient extent in order to make the temperature of the air comfortable. Neither Professor Lewes nor Dr. Hill would think of condemning the warming of the air of a room up to a certain point. It was the overheating of the air of rooms, so as to increase the capacity of the air for absorbing moisture to an uncomfortable degree, that had to be guarded against. If the air of a room to start with was down to near freezing-point, it would considerably increase the comfort of the inmates to raise the temperature to about 60°, and there were a great many buildings, workshops, halls, &c., where the only practical method of securing the comfort of the inmates was by warming the body of the air in the room. The gas-heated radiator performed this function very economically, and with practically no addition to the CO_2 content of the air. He ventured to accuse Professor Lewes of inconsistency in first of all saying that the old CO_2 bogey had been exploded, and should be disregarded, and some time later condemning the gas-radiator because it added only a very small quantity of CO_2 to the air of a room in carrying out the useful function of warming it. Seeing that warming the air of a room increased its capacity for holding moisture, the fact that the radiator at the same time added little to the amount of moisture, probably had no detrimental effect whatever upon the comfort of the inmates. Another point upon which he should like to join issue with Professor Lewes was where, though he did not lay down any definite opinion upon it, he said, "It is a perfectly debatable point as to whether the greater and greater amount of light which we are accustoming ourselves to use is not having a serious effect upon the eyesight." He personally did not think it was. It was only when they were abusing the light that any detrimental effect upon the eyes was occasioned. However well they lighted their homes and places of business, they were not, under the best of conditions, giving themselves better light than daylight; and he did not think they were likely to suffer from having their homes and places of business as well lighted by night as by day, provided they placed the source of light in such a position that it did not cause damage to the eye. It was not a question of having too much light, but merely of using it in the wrong way. This was what was having the effect upon the eyesight which they all deplored. He agreed with Mr. Potterton that it was a good plan to have radiators under the windows, because this tended to check the down-draught from the cool surface of the window; and by a judicious installation of radiators in this way, the radiant fires would give all the comfortable heating in the room required, without those variations in the different parts usually suffered from in a large room which was heated by open fires only. He proposed a vote of thanks to Professor Lewes.

Professor LEWES, in reply, said the gas industry must bless the man who invented the name "radiator"—called a radiator because it did not radiate one single degree of heat. Convectors from end to end, not radiators. The fact was that in all these cases they were dealing with convected heat only, because they were warming the air they breathed and leaving the solid objects in the room cold, which, as had been pointed out over and over again, was the very worst form of heating. On the other hand, radiant heat was that heat radiated out from substances which were at a temperature of about 1500° C.; and it did not heat the air. It left the air cool to breathe, and at the same time heated all the solid objects in the room, which was the right way. He had pointed out in the paper that it was impossible to have the right way when dealing with large rooms or workshops; and one point which had been entirely overlooked in the discussion was that it was for workshops—for working spaces—which they had to legislate in this matter. A temperature which would be a comfortable one—say, 65°—in a study for writing and reading, would be far too hot in a workshop, where more or less violent exercise was being indulged in; and the point he specially desired to emphasize was that, when one spoke of the necessity for removing the products of combustion of a radiator from a room, the real reason was this: It was all very well to speak of the products of combustion from a radiator having, if anything, less CO_2. It was all very well for a radiator manufacturer to assert that all the gases were absorbed by the condensation of moisure in the tubes—if he had a friend close by, he would close the other eye while he said it—but there were other things than carbon dioxide, and, what was worse, the heat containing them. He believed in heating by gas; and he also believed that in large rooms one must have convected heat. But what he did say was, convect the heat from surfaces which were not above the boiling-point of water; and then it would be found that the best method would be to use hot-water radiators with the gas outside. Anything very much more than this was not wanted; but, nevertheless, if possible, get radiant heat, even in a big workshop. There was another question, and that was with regard to the action of moisture; but here, again, they must not mix up actions which were hygienic and pleasant in a dwelling-room with the conditions of the workshop. In a dwelling-room, when the air was made hot it was stimulated, and took more moisture. It took the moisture from human beings, from plants, and from every living surface in the room. It brought about the rapid drying of the body, and gave rise to the unpleasant feelings which, with the old gas-stove, led to the bowl of water being employed. This bowl entirely disappeared, however, directly stoves were obtained which did their work in a decent way. In warming a dwelling-room, it was not too little moisture in the air, but too much, that had to be guarded against. A human being was giving off, under ordinary conditions, from the surface of the skin, a quantity of water which, in the course of the day, might amount to 1 or 1½ pints. In active work, in the workshop—especially doing piecework—one was, instead, giving off 4 or 5 pints in the course of the day from the surface of the skin; and therefore what gave a feeling of discomfort and a real feeling of lassitude, was the fact of there being too much moisture in the air—so much, in fact, that the air was near to the saturation point, and the perspiration from the skin, which needed to evaporate off in order to regulate the temperature of the body, simply remained there, and brought down the collar within two or three minutes. This was the point to be guarded against; not too great dryness in the air. With regard to lighting, apparently Mr. Goodenough did not think it was the amount of whiskey one drank, but the drinking of it neat that did the mischief. He entirely agreed. In the lighting of a room, one could use almost any amount of light one pleased, as long as the eyes were shaded from the direct impingement of the rays; but when he spoke of too much light being a debateable question, he was thinking rather more of this sort of thing. When he was young, he had to do all his schoolwork by the light of two candles at the side of his books; but he did not remember feeling any poignant discomfort from the amount of light, though he detested the work. Nowadays, however, one saw youngsters working over an unshaded mantle, giving 60 candles, within 3 feet of their eyes. Could they expect to keep their eyes in a fit condition after this? There was another point which he was quite sure was not a fallacy. Mr. Goodenough had said that, no matter how much light they had, they could not get as much as by direct daylight. This was perfectly true; but it did not follow that because they had had it all day it was going to improve them to have it all night. Nobody ever yet found Nature wrong. Nature gave a certain number of hours of daylight, and also a certain number of hours of night—to rest the eyes, probably, for all he knew—and he was not going to say for a moment that if they lengthened their days by taking a bit out of the night, they were not going to put a very severe strain on their eyes. Therefore, he maintained that it was a perfectly debateable point whether too much light was not really harmful.

The proceedings terminated with the passing of a vote of thanks to Professor Lewes.

COOKERY HALL.

The lecturers for the last week of the exhibition included Miss Lailey, Chief Demonstrator to the Newcastle and Gateshead Gas Company, who gained much applause for the pretty dishes she cooked, and for the very full and lucid explanation of the right and most economical method of using the gas cooking-stove. It may be interesting to note here the economy of gas as a fuel. For about 170 competitors, the consumption was 3200 cubic feet, costing, at 2s. 6d. per 1000, only 8s.; and for 35 cookery demonstration lectures, the meter registered 2600 cubic feet, costing 6s. 6d. This is an indisputable testimony to the value of gas for culinary purposes, for a great number of dinners and luncheons were cooked to illustrate the full use of the gas-stove. The lectures lasted, as a rule, about one hour, and the lecture-room was always full to overflowing—in fact, much too crowded for comfort; showing that the English housewife does really take a practical interest in good and economical cooking. The cooking tests were held twice daily during the month. The prize winners included housewives, cook-generals, school children, Boy Scouts and Sea Scouts, Territorials, bachelors, and church lads. They all received prizes in money, varying from two guineas down to 5s.; and the chief winners had a suitable present in addition. The prizes were presented on Friday—see p. 409.

According to the United States Geological Survey, cisterns which are properly constructed and receive rain water from roofs generally afford water of good sanitary quality; but if water of doubtful quality is stored, the supply is, of course, not safe for domestic use. Filters used in connection with cisterns are of value in making the water clear, but are generally of no value in removing disease germs. Many cisterns are divided into two parts by a brick wall; the water being admitted into one compartment and drawn from the other. In such cisterns the water passes through the brick, and in this way is improved in clearness and colour, but not generally in sanitary quality.

ELECTRICITY SUPPLY MEMORANDA.

REFERENCE was made last week to the statement of Professor Morris as to the "savings" that he has effected by converting his household culinary arrangements principally from coal (not gas) to electrical heating. This statement has done more than anything else that we have seen from an electrical source to prove the fallacy of the arguments put forward by electricians for public consumption as to the direct savings from electric cooking, based exclusively on baking joints of meat, and excluding all other elements in the account, such as boiling, and first cost of equipment and maintenance. Honesty, of course, could produce much electrical confirmation for Professor Morris, if honesty were allowed full play. But it is only on a partial consideration of the culinary operations that the electrician bangs the big drum, and invites the public to taste his wares, and adopt his cookery processes. There have been a few "Simple Simons;" but the majority of people refuse to be so classified. Professor Morris admits that the savings he has effected are due to dispensing with the services of a maid, and so saving her wages and the cost of the food and liquids she used to consume. Poor servant! We expect she did more than eat food, clean up fire places, and dust rooms; and some of the other work she did must now be done by someone else. Now one Murphy—Mr. F. Murphy, of West Ealing—writes to the "Electrician" to point out that at least 90 per cent. of our homes could not produce the savings that Professor Morris effected, for the simple reason that they cannot afford servants. As the philosophic Mr. Murphy says, "You cannot save on that which does not exist." If these homes cannot afford servants, they certainly cannot afford electrical operation in the kitchen, if the electrical operation is going to cost anything like the figures quoted by Professor Morris for a flat and a small family. Let it not be forgotten, too, in considering Professor Morris's figures, that the bulk of British homes are not occupied by electrical experts, nor have they the income of some electrical experts, nor does the refinement dwell in all these homes that one expects in the home of a professional man. Besides, there is not only the question of the cost of operation with an electric-cooker with its limited range, but there are other charges that must be incurred. Mr. Murphy takes five forms of electric-cooker, and gives the following figures:

Savings and Costs.

Make.	First Cost.	Cost of Set of Elements.	Annual Charges.			
			Sinking Fund.	Interest at 4 Per Cent.	Renewals.	Total.
A	£5·575	£0·75	£0·468	£0·223	£0·375	£1·066
B	£11·20	£8 40	£0 941	£0·448	£1·680	£3·069
C	£3·00	£1·25	£0·252	£0·120	£1 250	£1·622
D	£7·75	£1·55	£0·651	£0·310	£1·550	£2·511
E	£5·10	£0·3	£0·428	£0·204	£0·075	£0·707

These figures do not include the special accessories claimed by the electric-cooker, with their beautiful flat bottoms, which must to produce such efficiency as can be gained maintain their pristine evenness. From the above figures, says Mr. Murphy, it will be seen that whereas one stove could be hired out at 14s. per annum, another should not be hired out at under £3 a year. Furthermore, he holds that it would be unsound to let out the stoves on lower rentals than those shown, in the hope that the energy charge would be sufficiently large to swamp any deficit on the annual charges. We never read of the advocacy of electric cooking without being reminded of the growing number of incidents of which we hear of gas-cookers being re-established, in cases where electric-cookers have had an innings, on the score of the cost of the latter as well as because householders decline to be dictated to by the cooker as to when meals shall be served, and because of general unreliability. But we do not desire to sing a song about these incidents.

Heat Fallacies.

Our dear old friend the "Electrical Review" is constantly running its head against a brick wall. When it is trying to be most wise, we find it most entertaining. It seems to have come to the conclusion that the professionals of the electricity supply industry do not know much about heating; and so it sets out to instruct them. It informs them that "much error creeps into matters of engineering and manufacture from the failure to perceive that the utility of heat is not to be measured by temperature alone, or by calories alone." It acknowledges that the conversion of coal into heat energy with electricity as the vehicle is a circuitous way of obtaining high heat efficiency. Yet there are "small operations demanding heat which can be carried out by electrical means with commercial economy, even in competition with heat generated direct from fuel." There follows a little learned assumption with regard to the use of heat in cooking; and then we arrive at this profound statement: "By means of careful heat insulation, the electrically generated heat has been so conserved that it has become possible to conduct cooking operations with much less heat than is *ordinarily used* [the italics are our contemporary's] by direct fuel cookery." It would perhaps have been better if our contemporary had put the word "total" between "less" and "heat," because in cooking temperatures must be maintained and regulated according to the requirements of the articles that are being treated; and it is owing to this that the gas-tap affords an unrivalled means of getting the great variety of temperatures required in cooking, and maintaining them, whatever may be the atmospheric temperature or other prevailing conditions that go to affect the realization of suitable and maintainable temperatures. The question of obtaining a given temperature in an oven cannot be considered alone; one has to take into account both the maintenance of the temperature and the time factor. Our learned contemporary ignores these points.

Loss of Heat from Cookers.

The "Review" proceeds to say that there is great difficulty in burning solid fuel in such small quantities as will enable like economy to be secured as (it assumes) can be electrically obtained. We do not like using solid fuel for cooking purposes, though coke is a good article, especially for heating water. But here is a slap for us: "Gaseous fuel labours under the necessity of maintaining a constant stream of hot gases. The electric-cooker aims to attain a high temperature, and not to lose heat by convection, conduction, or radiation—all of which losses are unavoidable in other methods." Now did anyone ever read anything so comic in all his life? Whatever may be the "aim" of the electric-cooker, the fact remains that it does lose heat by all three channels of loss; and cook would sit very heavily on our gaiety-provoking contemporary if it produced a cooker, and she had to use it, that attained a high temperature, and then refused to lose any of it. How on earth the regulation to different temperatures, which plays such an important part in securing the finest results, is to be realized without there are losses of temperature puzzles us. We wonder, too, why after the electric-cooker has attained a "high" temperature, if it declines to part with heat, it is necessary to continue to feed it with electrical energy all the time that meat cooking is proceeding. Our contemporary was talking the other day about the profundity of the occupant of the church pulpit; we should like a little more of this particular profundity of its own, as the fun of it all is irresistible. There is that little hit too about gaseous fuel labouring under the necessity of maintaining a constant stream of hot gases. Seeing that British thermal units are so cheap supplied in gaseous form, what does it matter about a small part escaping? If, however, our contemporary has any doubt about the good heating efficiency of a properly constructed and insulated gas-cooker, then let it, or rather those who are responsible for such editorial matter as "Quantitative and Qualitative Heating," make thermometrical testings on the inner and outer casing of a cooker. If, too, our contemporary had been observant at the National Gas Exhibition, it would have seen how the waste heat from gas-cookers is being put to use in warming water for kitchen purposes; and thus additional economy is being realized, although water heating by gas or coke is such a cheap process that we are not very greatly enamoured of the idea of departing from the simplicity of the gas-cooker, and adding to its structural parts.

A "Small Fraction."

In another passage, we find our contemporary still groping about in the dead-past so far as gas heating is concerned. It says, referring to room warming: "The quantitative demands for heat have been badly catered for by solid or gaseous fuels, because it has been the habit to maintain a current of heated air, and only to use a small fraction of the heat by way of radiation, instead of by other means." It is not a nicely constructed statement. But will our contemporary point out to us a modern and ordinary gas-fire by which a current of heated air is maintained, and from which only a "small fraction" of the heat is given by way of radiation? Will it also quote its authority for saying that only a small fraction of the heat of a modern gas-fire is given off by radiation. The only two "authorities" we know who have ever agreed with the "Review" have been "Meteor" of the "Electrical Times" and Mr. Bastian, a maker of electric-heaters. But these two "authorities" have never shown us—they positively refuse to do so—that they have carried out gas-fire tests in the manner that has been done at Leeds University, and by Dr. W. A. Bone, F.R.S., by Mr. W. J. Atkinson Butterfield, by the Glasgow experts, by Mr. John Bond, and by others who have made scientific study of this matter. Perhaps it would be discourteous to mention what we should regard as a suitable description to apply to whoever is responsible for the quoted passage commencing with the words, "The quantitative demands," and ending with the words "other means."

Street Lamp Tests.

Mr. Haydn Harrison must now be doing a good business in carrying out street-lamp photometric tests to support the cases of electricity suppliers for converting gas-lamps to electric-lamps. He seems to be, for this purpose, the one and only photometrist—he being electrical to the very backbone. One of his latest engagements has been in the Royal Borough of Windsor, where the Electrical Installation Company, apparently not being satisfied that their lamps were speaking sufficiently well for themselves in comparison with gas-lamps, got Mr. Harrison to make some photometrical tests to support the work of their lamps, as well as prepare a report for them to pin to the tender for street lighting which they sent to the Council. We have only before us a modest paragraph upon the subject, as published in one of our

electrical contemporaries; and the paragraph does not give any information that is worth having. It states that Mr. Harrison found that three-light Osram lamp fittings (200 watts per lamp) were equal to the existing 8-ampere arc lamps, and twice as efficient as the gas-lamps. Of course, if Mr. Harrison had not found something of the kind, his report would not have been worth sending to the Council. The gas-lamp fittings are said to have been of a recent pattern, with three inverted low-pressure mantles enclosed in a special globe, having an external reflector. The paragraph speaks of Osram lamp fittings; but it would be interesting to know whether the "fittings" were of the Osram type, or of the Haydn Harrison type. It would also be instructive to have the tests and report of a gas photometrist on the subject for comparison with Mr. Harrison's tests and report. The metal filament lamps, Mr. Harrison says, give a much steadier light than either the arcs or the gas-lamps. The phenomena of street lighting grow majestically at the hands of electrical experts. It does not appear to be explained why inverted gas-lamps are unsteady in Windsor and not elsewhere. We are really coming to the conclusion that far better is it for unprejudiced municipal authorities to go out and see for themselves the general effect of street lighting by modern means than to depend upon the wonderful reports of experts—no matter of what school they be. After all, what is street lighting for but to serve the purposes of human convenience and safety; and therefore the human eyes of those who have to pay should be able to judge which is the best light under all the conditions of atmospheric change, which is the light that is the more reliable for public purposes, which is the light that gives the best diffusion, and which is the light that supplies the best value for general purposes for the money expended. On the point of diffusion, we fail to see any mention by Mr. Harrison of the fact that he found high-pressure gas-lamps in Manchester (which were improperly equipped), although of much lower candle power at the source than the almost naked flame arc lamps with which contrast was made, gave equal illumination at equal distances from the lamps. He also fails to mention that in the Holborn tests, made by the Borough Council's own officials, gas-lamps of lower candle power than the electric-lamps gave higher illumination efficiency at the point central between the lamps. Why is it Mr. Harrison's Windsor report tells a different tale?

Failures.

On the question of public safety, even London is not immune from the trouble of failures of public electricity supply. It is not such a great while ago that there were some big failures of electricity supply in London, the suburbs, and the Provinces. The principal one was in Islington, when streets, places of entertainment, hospitals, and a prison were involved. In last week's issue, a report appeared regarding a failure in London that had a widespread influence. Bayswater and Paddington were both involved. Streets were thrown into darkness; and so were the shops that depended solely upon electricity from the public supply mains, and not upon gas or private gas-driven electricity plants. A music hall suffered; and so did St. Mary's Hospital. The outlying districts of Hanwell, Brentford, Southall, &c., were thrown into partial darkness. A Picture Theatre at Hanwell could not open at the normal time; and public-houses and shops in these areas were occupied by irate owners who had to resort to the humble candle. Even the vicinity of Holborn and the Strand felt the effects. The Gaslight and Coke Company and the Brentford Gas Company are deriving advantage from the discontent engendered. Some of the people in their areas are now convinced that a "much steadier light" is to be obtained from gas than from its freakish competitor. At the fuel, light, and power exhibition at Sheffield, the Corporation Electricity Department commenced its display with a failure (*ante*, p. 365). On Dec. 17 last year, Sheffield suffered from a more general failure. A list of failures during last year, so far as they came to our knowledge, appeared in the "JOURNAL" for Jan. 7 last (p. 19).

Fires.

The £50,000 fire that took place in Long Acre last Wednesday week, and the cause of which is "officially attributed to a defect in an electric circuit," reminds us that the newspapers do not now so frequently as formerly state the cause of fires, unless produced by some agency other than electricity. Yet when the Fire Brigade returns are issued, there is then a revelation as to the number that are known to have been due to electrical causes; and one is left to wonder why the newspapers have departed from their former fair course of stating the origin, when the origin is definitely known, or there is clear evidence as to the source of the outbreak. Is it that the newspapers have been "got at" by certain interested electrical parties? If so, the newspapers are departing from their old independence. Even when there is a disastrous explosion electrically produced, in which life and property, or one or the other, are or is sacrificed—such as the cases of the Nottingham and Hebburn explosions, which were entirely due to a highly explosive gas being generated from the insulation material of electric cables—the flaring headline is given "Great Gas Explosion," which is misleading. We know of one case where a large factory, electrically driven, was destroyed by fire; and while the factory owners themselves have stated that the fire was caused electrically, the local papers have suppressed the statement. The supply was obtained from the municipal distribution system! The paragraph that appeared in our issue last week, headed "Dangers of Electricity" (p. 377) supplied other recent experiences of trouble that are worth the attention not only of gas competitors, but of those who are thinking of adopting electricity on the scores of "safety" and "reliability."

PERSONAL.

Owing to continued ill-health, the Secretary of the Portsmouth Water Company, Mr. JOHN L. WILKINSON, has resigned, and the Directors have appointed as his successor Mr. R. BISHOP, who has for some years been Cashier to the Company. Mr. Wilkinson receives a liberal pension.

OBITUARY.

The death occurred last Wednesday, at his residence in Croydon, of Dr. HENRY FRANKLIN PARSONS, formerly one of the Medical Inspectors of the Local Government Board—a position he relinquished early in 1911, when he retired under the age-limit regulations of the Civil Service. Dr. Parsons served on a great many Departmental Committees, including that on water gas; and he contributed papers to the "Transactions" of the Epidemiological Society, of which he became President, as well as to those of other scientific bodies. Deceased was in his sixty-eighth year.

By the death on Wednesday last, at the age of eighty-three, of Mr. JAMES LISTER, J.P., Liverpool has lost a citizen who did valuable public work in many directions, and enjoyed the lifelong esteem of all with whom he had business or social relations. Deceased was for about thirty years a Director of the Liverpool United Gas Company, but retired from the Board rather more than a year ago, owing to ill-health. In making the announcement at the annual meeting of the Company in August last year, the Chairman (Mr. H. Wade Deacon) expressed the hope of the Directors, and he believed of the shareholders as well, that Mr. Lister would always remember with pleasure his association with them. They would miss his genial presence, and would not easily forget him. The announcement of Mr. Lister's retirement from the City Council, which took place at the beginning of the present year, was received with universal regret by his colleagues, of whatever shade of politics; the amiability of his disposition having endeared him to all.

GAS ON THE CINEMATOGRAPH.

Interesting Series of Pictures Illustrating the Manufacture and Applications of Gas.

READERS will have seen, from the letter of Mr. F. W. Goodenough, the Chairman of the Executive Committee of the British Commercial Gas Association, which appeared in the last number of the "JOURNAL," that a cinematograph film, illustrating the mining of coal and the manufacture and applications of gas, was to be shown at the King's Hall Picture Palace in the Uxbridge Road, close to the National Gas Exhibition, from Monday to Wednesday last. This was, we believe, the first instance in this country of such subjects being brought before an ordinary audience by means of the film, though, as stated by Mr. Oscar Fogg in his paper submitted to the Association at their recent annual conference, a move in this direction is being made in America. We learn that in the present case the suggestion originally came from the Executive Committee of the Association; but Mr. T. Waddom, the Secretary of the Newcastle and Gateshead Gas Company, took it up, and with the assistance of the officials of other gas companies, carried it out most successfully. A film was prepared, and, with the co-operation of the proprietors of the King's Hall Picture Palace, the public were, by its aid, afforded an opportunity of making themselves better acquainted than they had previously been with the process of manufacturing and utilizing the wonderful commodity of which the manifold uses were to be seen so effectively illustrated at the neighbouring exhibition.

The series of pictures opens very appropriately with the calling of the miner in the morning by the "knocker-up;" and he is next shown taking leave of his family at the door of his cottage. He then proceeds to get his lamp, enter the cage, and go down into the mine. There he is seen at work winning the coal—the operations of putting in the powder, lighting the fuse, and blasting the mineral being vividly represented. The coal having been "won," the next thing is to convey it to the top; and the men's task being finished, they return to the surface. At this point a little humour is thrown into the exhibition by showing how a pit pony is broken-in.

The raw material for making gas now begins its journey to its destination—the retort-house. It is loaded at the rate of about 800 tons an hour; and the next thing seen of it is its unloading in the Thames alongside the Beckton works of the Gaslight and Coke Company. This is a very effective picture. The deposit of the coal in trucks and its conveyance to the retort-house are shown; as is also the operation of charging the retorts. The nature of this work is very strikingly depicted. If, however, one criticism may be allowed, it is that there was no contrasting picture showing coal carbonization without the concomitants of

flame and smoke. The next views give the spectators an idea of the apparatus used in condensing, washing, and purifying the gas; and this section of the series closes with a picture of the overhead telpher plant for conveying away and stacking the coke.

The gas having been made and purified, the various methods of utilizing it are next shown. This section begins with pictures illustrating the use of gas for industrial purposes; a view of the largest gas-furnace in the world being given. Then the spectator has brought before him the use of gas in the home. The first picture is one of a servant using a cooker; and she is seen opening the door of the stove to ascertain how the contents are getting on. The next shows how easily a man, on arriving home, may have what is called on the film "cosy comfort" by means of a gas-fire. The value of gas in the sick-room is very effectively depicted in a series of views showing the arrival of the doctor, the examination of the patient, the consultation of the thermometer, and the prompt raising of the temperature of the apartment by the lighting of the ever-ready gas-fire. The next pictures show a bath-room fitted with a geyser, and the facility with which a bath can be got ready for a lady who is being prepared by her maid to take it. The final pictures bring back the spectators to culinary matters, and the apparatus and method of cooking for 200 people by means of gas are shown to them.

The foregoing will give readers an idea of the pictures produced by the film. It was specially taken for the Association; and we believe that arrangements may be made with them for its exhibition in various parts of the country. Picture palaces are now to be seen everywhere; and though people visit them mainly to be amused, it might not be inappropriate to "sandwich" in a little instruction on a subject which has an important bearing on domestic economy and comfort. Let us hope that "The Manufacture and Applications of Gas" may in the near future be a line on the programmes of many cinemas.

COOKERY AND FOOD EXHIBITION.

A GAS-SIGN of noble proportions and attractive appearance informed the wayfarer in Vincent Square, Westminster, last week, that there was then being held in the Royal Horticultural Hall a Cookery and Food Exhibition. In these days, when so little can be accomplished without "publicity," a gas-sign is always a good thing to have (there are already many about, and there will be many more); but it is peculiarly appropriate in connection with anything appertaining to culinary affairs. Nowadays to speak of cooking is to mention gas in the same breath; the two are almost inseparable. It is true that there are still some persons who do not cook by gas; but this must generally be because they cannot get the gas. This being so, it was very gratifying to find, on visiting last week's cookery exhibition, that the Gaslight and Coke Company, in spite of all that has been done at Shepherd's Bush, had seen their way to make here, as on previous occasions, a thoroughly representative demonstration of the uses of gas in the kitchen—and elsewhere. Indeed, from the moment of seeing the gas-sign and the powerful Sugg lights outside the building until the time of leaving the hall, the influence of "gas" was about one.

The exhibition was the twenty-fourth of a series organized by the Universal Food and Cookery Association, with the object of awakening interest in the art of cookery, and endeavouring to give it the place which its necessity to health and progress demands. Many features of previous years were repeated—for instance, competitions for school children, army cooks, military hospital cooks, naval cooks, household and artizan cookery, non-flesh dinners, potato cooking, fish cooking, piping and decorating, egg and omelet cooking, pancake making, sauce making, &c. On the present occasion, however, a special feature of the programme was a series of "family meal tests"—the "family" to consist of five, and the average cost calculated to work out at 6s. 9d. per head per week, for breakfast, lunch, tea, and dinner or supper. The material was all bought locally, and prepared and cooked in the exhibition. Also there was banana cookery, condensed milk cookery, and cookery of other kinds. In short, a very full and interesting programme had been arranged under the direction of Mr. C. Herman Senn (the Managing Director and General Secretary of the Universal Cookery and Food Association). The competitions and demonstrations were all carried out by the aid of gas-cookers, in the model family kitchen, the lecture room, the model kitchen, the annexe, and the main hall itself.

In the lecture-room upstairs there were fitted two Sugg double "Regency" cookers and a Sugg single cooker; while hot-water was provided by a "Califont" geyser. The permanent electric lights in the room received assistance—which they were badly in need of—from a Podmore high-power low-pressure lamp, with a pneumatic switch. Similar lamps and switches were provided for the competitive and demonstration sections in the annexe. The first section (for the army and navy cookery competitions) had three Main double cookers, and the second section (for competitive demonstrations of various kinds) two Main double cookers; hot water being supplied in both cases—in the latter, by a Parkinson "Hydrotherm." In another annexe were the Shipping Federation, who carried out a number of demonstrations by the aid of Davis cookers and a Richmond "Blackpool" boiler. Emphasis was laid by those in charge of this exhibit on the fact that, though the men are taught to cook on a coal-range, they experienced no difficulty whatever in using the gas-oven.

Not content with the show made of gas apparatus in the kitchens, &c., the Gaslight and Coke Company again had a stand of their own fitted up at one end of the main hall. This was a really "live" display, for everything shown was in operation. It was an effective exhibit; and if it did not differ widely in scheme from some that have gone before, this was, no doubt, merely because those others had been so well arranged that very little improvement could suggest itself. On one side, fitted in an oak overmantel, was a Wilsons and Mathiesons "Sola" fire, in green enamel, with a duplex burner; and this, of course, received a large amount of attention from the visitors. On the other side, a "Cannon" cooker was built in a tiled recess, and there was fitted a Wilson No. 1 circulator. Hot water in small quantities was also furnished to a lavatory basin by a Maughan "Pearl" geyser. With plenty of space available, and tasteful decoration, these useful appliances were seen at their best. The interior lighting was by "New Inverted" burners, with pneumatic switches; beaded shades of various patterns being fitted. Then for general high lighting there were six Sugg 750-candle power lamps, of a pattern suitable for halls, &c. These were operated on the Sugg switch system.

The family kitchen and dining-room, used for the cooking and serving of the middle-class test meals already referred to, was placed opposite the entrance-door to the main hall; and attention was drawn to it by the true announcement that, "The hand that cooks the family meals exercises a power for good or evil." The kitchen contained a Main closed-in hot-plate cooker in a tiled recess, and a Wilson circulator—hot and cold water being laid on, as in the case of the Company's own stand. The dining-room was lighted by a handsome "New Inverted" pendant, with large burner, and red silk shade lined with white. The Sugg switch was used for lighting and extinguishing. In the kitchen there was a Sugg lamp and switch. Among the general exhibitors using gas-stoves in their stands was a firm demonstrating paper-bag cookery. An enclosed-top Main cooker was employed; and it was explained that for cooking in paper bags a gas-stove is undoubtedly the most useful, because of the ease with which the heat can be regulated.

There were several stands at which apparatus was shown in which gas is utilized. There were two patterns of washing machines, for which hot water can be conveniently provided by gas. Messrs. R. & A. Main drew attention to some of their specialities—the "D.S.O." and St. Nicholas fires, the closed-top cooker, and a gas baking oven. The last-named stove has two chambers, one over the other; and efficient arrangements are made for regulating the heat. Messrs. Still and Sons are well-known as makers of water-boiling apparatus, &c., for restaurants; and they have also an automatic toaster and griller—the "Metropole"—which is substantially made in cast iron, and possesses advantages from a gas-saving point of view for persons requiring to toast or grill a great deal. The drawing out of the grill automatically shuts-down the gas, while the reverse action turns it on full. Messrs Revy, Phillips, and Co. make apparatus designed to secure similar ends.

A German Contract with America.

In the course of some remarks on the general reduction of dividends being paid by German companies, the "Hannoverscher Anzeiger" of Oct. 27 contained the following statement: "The shareholders of the Stettiner Chamottefabrik Didier may shortly experience a very unpleasant disappointment. This undertaking, which has enjoyed such brilliant prosperity, and has, during the last few years, paid dividends as high as 20 per cent. and over, entered last year into a large contract with the Bethlehem Steel Corporation of America for the delivery, in conjunction with the Bamag Company, of coke-oven plant. The business, which promised profits of millions of marks, now holds forth the probability of a loss of millions. In consequence of this, it is believed that the Stettiner Chamottefabrik will be unable to pay any dividends for the year 1913, as against 12 per cent. last year. For the same reason the Bamag Company will have to reduce its dividend, which stood at 9 per cent. last year. The shareholders are led to expect the worst, since the Boards of both Companies have, up to the present, given them no definite information about the fateful contract."

London and Southern Junior Gas Association.—In a circular to the members, the Hon. Secretary (Mr. Ernest Scears) announces that the visit to the Birmingham works of Messrs. John Wright and Co. has unfortunately had to be postponed untilearly in 1914. On the 28th inst., Mr. F. S. Larkin will read a paper entitled "Notes on Gas-Stove Construction;" and on the following day there will be a visit to the Chingford reservoirs of the Metropolitan Water Board to inspect the Humphrey gas-pumps.

"Estimates and Valuations."—We have received from Messrs. John Allan and Co., of 8, Bouverie Street, E.C., a work bearing the above title by Mr. Jesse F. Scott, Assoc.M.Inst.C.E. It is a handbook of data and prices for gas engineers; and the value of the subject dealt with is emphasized in an introductory note by Sir Corbet Woodall, D.Sc., M.Inst.C.E., to whom the author has been well known for some years. The price of the book, which will be more fully noticed in a later issue, is 10s. 6d.

BRITISH COMMERCIAL GAS ASSOCIATION.

"THOUGHTS," AFTER GUILDHALL AND SHEPHERD'S BUSH.

By "R. W. E."

A YEAR since Manchester! How soon it has passed! One ponders for a moment on the quick march of time. Truly, since the idea (originated in the Dublin paper) was born, the child has grown rapidly. To-day, a sturdy youth, looking into the future with all the optimism of its tender years. What shall we prophesy? Not failure—surely success.

The distinguished action of the Lord Mayor in opening the proceedings must remain within our memories for all time. The quiet, but stately, ceremony brought home our responsibilities. The simple, but genuine, welcome by that "thrice crowned President" (now Past-President) gave the touch which appealed to our senses and awakened us from the spell woven by the introductory proceedings. We yield to no one any greater degree of grace and courtliness than that which characterizes the actions and words of our leader of the gas industry.

Then our popular President took the reins with that clear and unmistakable elocution he has spoilt us with—to such an extent that if other speakers fail to bring out their language, we invariably wish they would take their cue from the "Man from Liverpool." So far we found ourselves placed in a delightful atmosphere, which without doubt continued in our surroundings until the last.

What then was the key-note of this significant meeting of our Association? There can be no possible doubt about it. It was the setting-up of an ideal, which was "perfect service." You may add to or deduct, but the answer remains the same—success follows. We all have our own worlds to conquer. Some are strewn with more roses than others; but undoubtedly there are always some, and these can be cultivated, from which others give birth to sweeten the task and brighten our way. The substance of three of the papers, on the main object, was very much on the same lines. Mr. Fogg told us what they did in America; while Mr. Waddom outlined Newcastle's excellent methods; and Mrs. Brereton presented ideals for our future. To those of us who have been "alive" to things for some years, there was little to learn from the first two, except in variation of methods, and so on. The latter paper, however, not only indicated our duty to the consumers (especially women), but clearly brought home the fact that very many of us lacked vision. Whatever may be excluded for the moment as coming outside the scope of immediate practical problems, this could be most certainly set up as ideals to aim at. It must not for one moment be taken that these remarks are not sincere. They are genuine. Mrs. Brereton's paper undoubtedly touched on social problems, and, although steering clear of political significance, may be paralleled with aims which belong to others. Such aims must appeal to thinking men. Improve the conditions of the home and those within. The gas industry can assist very materially in this campaign. It will take time, and the crusade must not only be waged in the home, but equally so in the school. The future generation must be taught in its infancy the great advantages of gaseous fuel. Then where better, outside the home, than the school? The reader of this particular paper directed our attention to the school authorities, as regards the provision of baths, &c., which indicates a channel for future business. Educate! Educate!! Educate!!! Never was there so much of this one theme expounded in our meetings. There is, however, a limit. If we do not discriminate (and Mrs. Brereton did), some harm possibly might be the outcome. Other than those whose duty it is to specially meet the consumer, what is undoubtedly wanted is commonsense, tact, and an intelligent grasp of the use of gas for domestic purposes. This is what the ordinary fitter is being taught. It is impossible to send special representatives to reply to every question that a consumer may put to a gas man, while on the premises. If the fitter finds the information sought for is beyond his ken, then bring in your special representative. The idea of a consultant at the British Commercial Gas Association is in the right direction, especially for industrial purposes. But there are so many day-to-day points that necessitate immediate attention, that it is imperative to have at least a liberal supply of intelligence on tap at home; otherwise business would soon go to the electricity camp. If no other paper had been read, that of the "idealist" would give us ample food for the next year, and further, so far as relates to the cultivation of vision and the improvement of our ideals.

The other papers reflect much credit on their writers. That of our esteemed friend from Tottenham was excellent; and one sentence of the Executive Chairman's speech added to its value tremendously, wherein he sensibly pointed out that the hot water heater tended to enlarge the use of the cooker, and thus duplicate the benefit consequent upon its installation. Mr. Thornton was thorough; and his paper will undoubtedly show many new pastures for future development.

Now, baring the bone, what is the *crux*? Our future domestic field is with fires—not only in bedrooms, ante-rooms, doctors' consulting-rooms, and the like, but for general use, whether in the middle class or the upper class living-rooms. These have not yet been secured. Of course, exceptions can be cited; but generally gas has not displaced the coal-fire.

Assuming all things pertaining to good service, &c., have reached the perfection that all progressive spirits would desire, do you seriously think the object now mentioned would be achieved with 3s., or even 2s. 6d. gas? I don't. Some years ago I directed some comprehensive experiments in gaseous heating, and I tried tremendously to balance the weekly allowance. But the human element failed. It is so difficult to get the most intelligent to adjust or regulate the consumption to their means. Well, then, if ideal service and all other perfect conditions will not achieve the solution, we come back to bedrock price. This is the point. In an article I published in 1910, I wrote:—

> The ordinary consumer at present offers the widest scope for the fire; and I am quite sure that if those companies who are working under a sliding-scale will look at the question unselfishly, it will be found that, instead of reducing the general price without getting anything like a reasonable response in increased consumption, it would be better to give rebates to encourage consumption in those fields that are yet scarcely developed. Meanwhile, it may not result in increased dividends; but it enables one to broaden the base of business, and in the long run so develop the sales as to bring about general economy by virtue of greater all-round use of plant and mains—ultimately securing a more all-day, all-the-year round gas consumption, which, while keeping our competitors off this untouched and practically virgin heating field, will prepare our industry to better combat, perhaps in times of more stringent competition, the claims for lighting. At present a reasonable price for lighting holds its own trebly—at least, as against electricity at 3d. But in time to come, when the metallic filament lamp has become more popular and cheaper, when electric stations have recovered from the set-back due to loss of consumption following the use of economical lamps, then the price for current will undoubtedly be cheapened. When that time arrives, the gas industry must be ready, and more than ready, with all the resources at its command, to successfully defend itself and attack its competitors. But unless one has a sound, well-constructed undertaking, on a broad basis, cheap in capital, economical and efficient at works, enterprising and up-to-date outside, with a business not confined to one or two channels, one cannot "play the game" successfully.

I need not alter or add a word. The price of gas for fuel, cooking, and heating must come down. Sell gas at 1s. or 1s. 6d., if it were possible, and you would see the difference. I venture to think that our expense ratio on the district would drop 50 per cent. Why? Because, the consumer would then view gas as a necessity of life, and so necessitate, in consequence of the constant use, less service per 1000 cubic feet; for should there arise a defect the consumer would hasten to the gas office and report it, as under such circumstances no delay could be tolerated—that is, waiting until an inspector or a lady demonstrator called in the ordinary way. The consumer would further, from such constant use of gas all the year, be speedily competent in every particular as to its economical use; and even if a little extra was used through forgetfulness, on an occasion, the expense so incurred would not be sufficient to give a moment's thought.

Cheap gas of acceptable quality. This is my point, which will justify gas undertakings submitting it for all purposes, all day, all the year. At present gas-fires are being fixed in thousands. With what result? Sometimes three in one house; and if it was accurately known, the net increase due to them would not justify the existence of one fire. It may be disputed. There is no getting away from the fact that in many houses the only gas-fires are in bedrooms, or the room not used for living. With a mild winter, how much are such fires used? Very little. With cheap gas, one fire in the living-room would be of more use to the consumer, and improve the conditions of women, than half-a-dozen otherwise, and of ten times more benefit to the gas undertaking.

Aim at cheapening the product, and get it to the consumer at bedrock. Give good service, which will cost less under increased consumption (per service) conditions. Don't forget that there is a competitor very much alive, offering to supply electricity for fuel and power from one-fifth to one-tenth the price charged for light, conditionally that it is also used for the latter. The gas industry is still on the crest of the wave. Such a position will not be maintained if we persuade ourselves that cheap price is not the primary but a secondary consideration.

And so I wander. The "thoughts" are now narrowing down, and I find one at least a year old. It is a back number, but, unfortunately, I have not placed it in its pigeon-hole because I am unhappy about it. Oh! you members of the British Industries. This little matter between us is a nuisance. Some day one of you will be President of the British Commercial Gas Association. I hope you are taking to heart the little hint I gave you a year ago, and since gently repeated it. I am sure your consciences are not asleep. You too have ideals, and when we joined hands with you it was hoped on the understanding that it was "halves, partner," "halves," and no less. The British Commercial Gas Association wants £30,000 a year—£100 a working day, for your good and mine. Don't forget.

We have received from Messrs. Emmott and Co., Limited, of Manchester and London, the "Mechanical World Pocket Diary and Year Book for 1914." This is the twenty-seventh issue, and it embodies many new features compared with its predecessors. The section on "Steam Turbines" has been partly re-written, and new data and illustrations have been introduced; while the table of pipe-threads has been re-arranged to include both Whitworth and British standard dimensions. The work generally has been subjected to thorough revision. It is a useful collection of engineering notes, rules, &c., and the price is only 6d. net.

AMENDMENTS OF THE MODEL CLAUSES.

Gas Suppliers and Residual Products.

THE Model Bills and Clauses as amended and applicable to the Bills for the coming session have lately been issued. In the Gas Bill there has been an important alteration in the text of clause 5, indicating the general purposes of the company. It now reads as follows:

> The company shall be established for the purpose of manufacturing and supplying gas for lighting, heating, motive power, and other purposes within the limits of this Act, and may convert, manufacture, and sell all residual products resulting from the manufacture of gas, and generally may carry on the business usually carried on by a gas company.

In the preceding Model Bill, the clause stood thus:

> The company shall be established for the purpose of manufacturing and supplying gas for lighting, heating, motive power, and other purposes within the limits of this Act, and may convert, manufacture, and sell all residual products resulting from the manufacture of gas *by them*, and generally may carry on the business actually carried on by a gas company.

It will be noticed that the words we have italicized have now been omitted from the clause.

It will be interesting to show the change the clause has undergone in the past two years; and with this object we give the text as it stood in the Model Bill for the session of 1912.

> The company shall be established for the purpose of manufacturing and supplying gas for lighting, heating, motive power, and other purposes within the limits of this Act, and may *provide, produce, sell, dispose of, and deal in gas, coke, tar, and all other residual products resulting from the manufacture of gas*, and generally may carry on the business usually carried on by a gas company.

Here, again, the words in italics are ours; and the altered construction of the clause previously quoted shows the effect of the legislation of 1912.

In the Model Bill just issued, the following form is given for the clause for insertion in the Bills promoted by local authorities.

> The corporation may, subject to the provisions of this Act, manufacture and supply gas for lighting, heating, motive power, and other purposes within the borough [or limits of supply], and may convert, manufacture, and sell all residual products resulting from the manufacture of gas.

A few alterations have been made in other clauses, and their nature may be briefly indicated. In the clause relating to the special purposes fund, it is now specified that it shall be applicable only to meet such charges "as an accountant appointed for the purpose by the Board of Trade shall approve." In the Model Bills for 1912, the words were "as a chartered accountant or incorporated accountant, being the auditor of the company or appointed for the purpose by the Board of Trade, shall approve." Clause 16 has been somewhat shortened. In clause 17, dealing with the power to lay pipes in private streets, it is set forth that the company may supply with gas any premises abutting upon or being erected in the street; and for this purpose the Gas-Works Clauses Act, 1847, is to apply "as if section 7 of that Act were excepted from incorporation in this Act [or the Act of]."

INDUSTRIAL GAS POISONING.*

THE work of Dr. J. Rambousek on "Industrial Poisoning," which Dr. T. M. Legge has thought worthy of translation into English, is divided into three parts. The first gives descriptions of the industries and processes attended with risk of poisoning, and the incidence of such poisoning; the second part deals with the pathology and treatment of industrial poisoning; and the third part describes preventive measures against industrial poisoning. The arrangement here adopted has merits for a treatise on industrial poisoning in general, because the same poison, or the same cause of poisoning, may occur in several distinct industries; but it has the disadvantage (which the author recognizes) that reference has to be made to each of the three parts so as to find all that is said about poisoning in connection with a particular industry. The arrangement involves repetition, and is cumbersome for readers whose interests are limited to a single industry. Nevertheless, we think the author is justified in his choice of it, out of consideration for those whose industrial outlook is less restricted.

It is open to question, however, whether the very comprehensiveness of Dr. Rambousek's work has not tended to detract from its trustworthiness. No one can be expected unaided to write with accuracy and a due sense of proportion of all the different chemical industries, in all of which there is a more or less remote risk, direct or indirect, of poisoning of some of the persons employed. But it is open to the compiler of a cyclopædic treatise to call upon the specialist, who has an accurate and thorough knowledge of his own industry, for information and guidance. By some such means mistakes and inaccuracies, which lead the technical reader to disparage the whole work, can be avoided. Dr. Rambousek, however, and his translator, Dr. Legge, have marred an otherwise excellent work through having neglected to seek the aid of specialists in particular industries. We have arrived at this conclusion from the treatment which we find they have accorded to those branches of chemical industry in which readers of the "JOURNAL" are specially interested.

Without reference to Dr. Rambousek's German text, which we have not to hand at the moment, we are unable to apportion the responsibility between the author and the translator for the inexactitudes of description of the processes of gas manufacture which occur in this English version. They are numerous, however, and often in the particularly irritating form of partial truths. We wonder what impression a reader otherwise uninformed as to gas-works processes will gain of them from a perusal of this volume. Since "the book is intended for all who are, or are obliged to be, or ought to be, interested in industrial poisoning," it is patent that clarity and accuracy in descriptions of industrial processes are even more imperatively called for than in a book written primarily for technical men. For instance, the gas manager will pass over with a smile the description of "Standard" washers as "rotating, horizontal cylinders having several chambers filled with staves of wood half dipping in water," but what conception will it convey to many of those who are "obliged to be, or ought to be, interested in industrial poisoning?" Again, "heavy coal tar" is named as the medium for washing coal gas for the extraction of naphthalene, where it is obvious to the gas man (but not to many of those for whom the book is intended) that heavy coal tar *oil* is meant.

The author frequently displays a lack of all sense of proportion in his illustrations of the risk of poisoning in various industries. Isolated cases of poisoning of no special significance are quoted by him without reference to the numbers of the workers exposed to similar risk in the same industry who escape. We learn that in Prussia, in 1904, "a worker became unconscious while superintending the ammonia-water well, fell in, and was drowned." This is quoted as an instance of industrial poisoning in gas-works attributable, in part at least, to ammonia. How many workers, before and since, have attended to liquor wells on gas-works without becoming unconscious, falling in, and being drowned; and have no workers become unconscious, fallen in, and been drowned in docks, harbours, water-works, &c., without poisoning being alleged as the cause?

As Editor, Dr. Legge has occasionally augmented and supplemented Dr. Rambousek's statements by footnotes, in which more recent and complete data are given than in the body of the work. Unfortunately, these footnotes are far too rare. It seems a pity that Dr. Legge (than whom no one in Europe is in a better position to compile a work of this kind) did not take the pen in his hand as author instead of as translator. Apart from the official statistics which he has at his elbow, he could for the asking have secured for such a purpose much invaluable information from the authorities of industrial undertakings in this country. For instance, we doubt not that the London Gas Companies would have willingly given him information as to the incidence of sickness and poisoning in recent years among their thousands of workers. It is futile to attempt, as is done in this book, to draw inferences and conclusions applicable to the whole industry at the present day from the old and incomplete data quoted by Dr. Rambousek.

How incomplete and absolete are many of the particulars given by the author will be evident from the meagreness of his references to regulations regarding acetylene. The only regulations which he quotes were issued in Prussia in 1897. They refer mainly to the compression and liquefaction of the gas—operations which are fraught with dangers which were little understood at that date, and have little or no bearing on industrial poisoning. Except for a reference to some Austrian regulations issued in 1906, there is nothing said as to modern regulations, such as those by which the manufacture and use of acetylene are now controlled in Great Britain, France, Germany, the United States, and other countries. These regulations appear in modern technical text-books, and many of them have a direct bearing on the prevention of poisoning. Omissions of this character go to prove our contention that a work of this kind cannot be properly written without the collaboration of technical men.

The publication of the book seems to us likely, owing to the defects indicated, to prove prejudicial to the chemical industries of this country. The mischievous persons who seek, with more haste than reason, to promote so-called social legislation—the chief effect of which is to sap and destroy the initiative and individuality which are the mainsprings of industrial progress—may find in its pages passages which, taken by themselves, will seem to justify them in making further essays in legislation. Yet even the whilom much-belauded suppression of the use of white phosphorus in the match industry is now shown by figures which are quoted by Dr. Legge to have had little or no justification. In ten years before the suppression was enacted, the number of cases of phosphorus poisoning in this country averaged only 1·7 per annum, and the fatal cases were five in the whole decade. Moreover, it is well known these cases would not have occurred had proper precautions in the use of the white phosphorus been everywhere observed. Nevertheless, owing to hasty legislation, the public has now to be content to use inferior matches, while chrome poisoning is rife in match factories in countries where the use of white phosphorus has been suppressed.

The second part of the work, in which the symptoms and treat-

* "Industrial Poisoning from Fumes, Gases, and Poisons of Manufacturing Processes." By Dr. J. Rambousek, Professor of Factory Hygiene, and Chief State Health Officer, Prague. Translated and edited by Thomas M. Legge, M.D., D.P.H., H.M. Medical Inspector of Factories, Joint Author of "Lead Poisoning and Lead Absorption." London, Edward Arnold; 1913.

ment of industrial poisoning are dealt with, is likely to be of considerable value, and cannot well be misused, as we fear may be the lot of the other parts. Our chief objection to the latter is that they embody incomplete and often irrelevant data, and being written without the guidance of technical men, do not afford trustworthy information for the guidance of those who may aim at drafting rules and initiating legislation for preventing industrial poisoning. The more information that can be given on the incidence, symptoms, and treatment of industrial poisoning, the better for all; and as a contribution thereto we welcome the appearance of this book.

WAGES AND HOURS OF LABOUR IN 1912.

One is quite prepared to learn that the number of persons who had their wages increased during 1912 is exceptionally large; and this is, indeed, stated to be so by Mr. F. H. M'Leod, who signs the "Twentieth Annual Report of the Labour Statistics Department of the Board of Trade on Changes in Rates of Wages and Hours of Labour in the United Kingdom." The details given are mainly based on agreements between organizations of employers and of workpeople, supplemented by such information as exists for those employments in which collective bargaining does not obtain; and though, of course, they are not complete, they are of use as affording an indication of the fluctuations in the market rate for labour in most of the principal industries. The changes recorded in wages and hours are for an ordinary week's work; the changes in average earnings arising out of variations in the extent of employment obtainable not being dealt with. Changes affecting less than five workpeople are not included in the statistics.

After a period of depression, wages had for two years been rising in sympathy with the improvement in trade and employment. But until almost the middle of 1912 the rate of progression continued to be slow. After May, however, the movement became more rapid, with the result that the number of workpeople whose wages were reported as increased during the past twelve months was in excess of that for any previous year, while the aggregate amount of the net weekly increase has been exceeded only twice within the past twenty years—in 1900 and 1907, both of which were years of exceptional prosperity. The changes in wages noted last year were, with three small exceptions, all increases; and the upward movement was common to every group of trades, though it was specially marked in the building and textile trades and in mining and quarrying. The increases recorded in connection with the transport trades were much above the average, though they did not reach the extraordinary figures of the previous year.

The number of workpeople reported to the Department as affected by changes in wages during 1912 was 1,818,240, in which total agricultural labourers, seamen, and railway servants are not included, as the numbers affected are not known. Increases amounting to £139,410 a week were received by 1,806,444 workers; while 46 workers sustained decreases amounting to £6 a week. The remaining 11,750 had upward and downward changes leaving their wages at the same level at the end as at the beginning of the year. Thus the net result of all the changes was an advance of £139,404 per week, as compared with changes in 1911 to 916,366 persons, which resulted in an increase of £34,578 per week. What these figures mean, of course, is that the total wages bill of the country, in the industries covered by the returns, for a full ordinary week's work at the end of 1912, would exceed that for the corresponding week of 1911 by the amount stated. The average wages paid last year did not exceed those of the previous twelve months by this sum, as the actual changes took place at varying dates; but an attempt has been made to estimate approximately the total amount of additional wages paid in 1912; and the figure named is close upon £3,000,000. The proportion of the industrial population (with the exceptions already named) affected by ascertained changes in wages in 1912 was 18 per cent.; the proportion of workpeople affected by the changes being, as usual, highest in the coal mining industry—51 per cent.

Of the total increase, 55 per cent. was due to changes in the coal mining industry; there being changes in every coalfield in Great Britain, apart from any resulting from the adoption of the Coal Mines (Minimum Wage) Act, as to which the information available was insufficient for statistical purposes. In every instance, with the single exception of the Forest of Dean (where the increases and decreases counterbalanced each other), the changes resulted in net increases. Actually, 921,793 workpeople had net increases amounting to £76,905 per week; whereas in the previous year 390,793 persons sustained a net decrease of £9553 per week. Everywhere wages were higher at the end of 1912 than at the end of 1896 (to go back sixteen years); but, with the exception of the Federated Districts (Yorkshire, Lancashire, Cheshire, Nottinghamshire, Derbyshire, Leicestershire, Warwickshire, Shropshire, parts of Staffordshire, and North Wales), South Staffordshire and East Worcestershire, Bristol, and Somersetshire, they were still below the high level attained in 1900. No less than 92 per cent. of the changes last year were arranged by Conciliation Boards; the most important exception being Northumberland, where the alterations were effected by direct negotiations between representatives of the two parties. The decisions of these Boards as regards wages are, says the report, based largely on the selling price of coal; but in only one case—that of Durham—were any particulars published of the ascertained selling prices in 1912. For this district, the average prices for the four quarters of the year were 8s. 1·47d., 8s. 0·65d., 8s. 7·18d., and 8s. 11·8d. per ton; the increase in price in the first and third quarters resulting in an increase in rates of wages of 3¾ per cent. in each case.

The number of workpeople affected by changes in wages last year in the metal, engineering, and shipbuilding trades was 281,547; and of these 275,297 received net increases amounting to £23,888 per week, while the remainder had upward and downward changes which left their wages at the same level at the end as at the beginning of the year. Employment in the engineering trade continued on the whole good during 1912; the percentage of trade union members unemployed being 3, as compared with 11·6 in 1909. In the textile group of trades, 341,498 workpeople had their wages advanced £15,255 per week. Coming up to date, it is stated that so far in 1913 the upward movement in wages generally has continued at an accelerated rate; the total for the first eight months being greater than the whole gain in 1912.

Details are set forth in a series of tables; and turning to these, it is gathered that 164 gas workers in company employ received a total weekly rise in wages amounting to £13. As to the local authorities, which are placed separately, at Bradford gas-works labourers and foremen stokers received increases ranging from 1s. to 2s. per week; while in Leeds gas-stove repairers also enjoyed a rise of the latter amount. At Rotherham general advances were given to labourers, stokers, lamplighters, and gas-fitters; and the Sheffield Street Lighting Department increased the wages of their mantlemen by 1s. per week. Meter repairers, gas-fitters, &c., at Blackburn were among the fortunate ones, as also were stokers and labourers at Bolton. Rises at Bury made the wages of yard and outdoor labourers 25s. per week, meter inspectors 29s., foremen stokers 45s., stokers 41s. 3d., and furnacemen 40s. 7½d. The wages of gas stokers at Macclesfield were brought up to 5s. 8d. per shift, coalers to 4s. 6d., and lamplighters and labourers to 5d. per hour. At Manchester, there were concessions bringing the wages of gas makers, &c., to 4s. 5d. to 6s. per shift, labourers to 26s. per week, gas-stove cleaners to 26s., meter repairers to 38s., labourers in the Street Mains and Lighting Department to 25s. and 26s., and lamplighters to 25s., 26s., and 31s. a week. General increases were given at Oldham, Stockport, Birmingham, and Leicester; and at Rochdale, Hereford, Nottingham, Salford, and various other places, certain employees in connection with the gas undertakings fared similarly.

A glance at the portion of the report which relates to changes in hours of labour, shows that in the past year there were 105,317 persons affected in this respect; the net result being a reduction of 210,556 hours in their weekly working time. The changes recorded do not, of course, include temporary alterations in working hours owing to changes in the state of trade, or regularly recurring seasonal variations. There were no changes of outstanding importance in 1912; but of the total number of people affected more than one-half were engaged in the building and engineering and shipbuilding trades. In the past twenty years (that is, since 1893), some 2½ million workpeople have had their recognized working time per week reduced by nearly 6 million hours; the principal changes being, of course, brought about by legislation affecting underground miners and textile factory operatives. Reductions in hours were granted last year to lamplighters at Oldham, meter repairers at Blackburn, gas labourers at Manchester, and stokers at Wolstanton.

THE GAS INDUSTRY IN NORWAY.

So little is ever heard of the gas industry in Norway, that it is interesting to learn that the country is having its share of the prosperity which, at the present time, characterizes gas affairs in most civilized parts of the world. The "Journal für Gasbeleuchtung" for Oct. 25 contains an article upon the subject, of which we give a translation.

Norway is famous over the whole world for its great wealth of natural water-forces, which the last few years have been largely developed by companies and applied to the production of electric current. The price of current is therefore particularly low. Naturally in these circumstances the competition between the gas industry and electricity is exceptionally keen. An article appeared in the number of the Christiania weekly technical journal, "Teknisk Ukeblad," for Aug. 15 last, in which the following information may be found interesting.

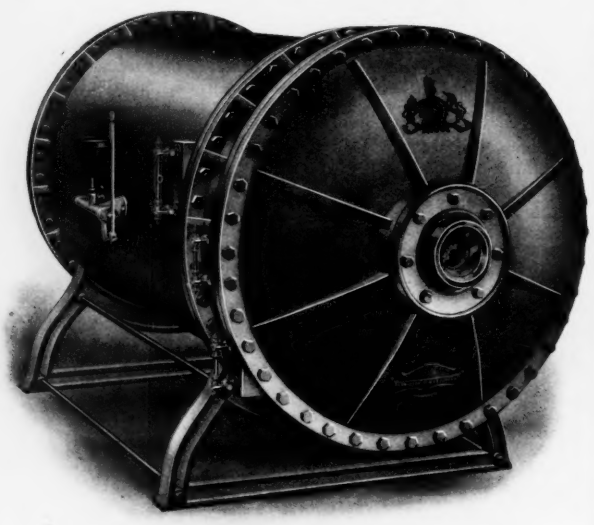
"As in most countries, so also in Norway has the use of gas increased considerably during the last few years. When, at the beginning of this century, electricity began its victorious career the whole world over, downfall and death were prophesied for gas-works. For a time the outlook was undoubtedly threatening; for electricity won over from the gas-works a large part of their users of light and power. Prophets great and small then foretold that the time was not far distant when electricity would replace gas also for cooking and industrial purposes. In the meantime, however, matters have gone just the other way. Even if a large number of the former light and power consumers are lost, yet gas is continually gaining new ground. For cooking, it is really indispensable. Some of the best electro-technical men acknowledge, even in public, the superiority of gas in this direction. The best proof of the great increase of the industry in

Norway is the fact that old works no longer suffice from the point of view of output capacity, and alterations and additions are being made in all directions. Last year the average increase in production in the whole country was 15·4 per cent. Individual percentage increases were for instance: Christiania, 11·1; Bergen, 27·3; Drontheim, 15; Stavanger, 13; Aalesund, 10·3; Kristiansund N., 30; and Moss, 6·3. This rapid development enables the gas-works to reduce their prices, so that gas can now be rightly regarded as the cheapest fuel of its kind—as is borne out by the constantly increasing demand for it. Gas is now found to be just as indispensable in Norwegian towns as electricity, and everywhere the question is being considered of installing or enlarging gas-works. And this feeling among the people that gas is a necessity of life has grown up in spite of the extensive use of electricity. At the same time there is a growing feeling that Norwegian home industry should be more applied to the work, and that gas-works enlarging and building should not be entrusted so much to foreign firms. It is thought that more home capital should be employed, and encouragement given to home technical circles."

THE LARGEST HIGH-PRESSURE GAS-METER YET MADE.

The accompanying illustration is of particular interest, as it represents one of the milestones on the road of meter construction, and marks progress in the general development of the industry's affairs.

There is a little history attached to the purpose for which this meter is required. It will possibly be remembered that, in the last session of Parliament, the Mynyddislwyn District Council obtained authority to become the suppliers of gas in their own administrative area; part of the distribution system that they required being then the property of the Risca District Council. But the transfer of this property was contemplated in the purchase clause inserted in the Risca Council's Act of 1909. By clause 53 of their Act, the Mynyddislwyn District Council were empowered to enter into agreements with any local authority, company, or



The 10,000 Cubic Feet Per Hour High-Pressure Wet Meter.

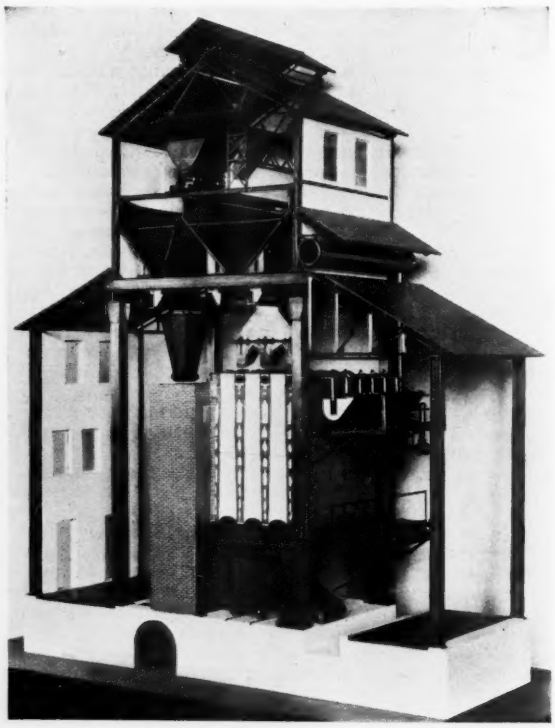
person within or beyond their gas limits for the purchase of gas in bulk for the supply of their district. Of this power they have taken advantage, and have entered into a contract for the purchase of gas in bulk from the Risca authority. The Gas Engineer of the Risca District Council (Mr. Guy S. Davies) determined to meet the requirements by means of a high-pressure supply; and it is for this purpose that the high-pressure wet meter which is here illustrated has been constructed by Messrs. Parkinson and W. & B. Cowan, Limited, and has been fixed by them at Wattsville, on the border of the Mynyddislwyn area.

We believe it is quite safe to say that this is the largest high-pressure meter yet made, and put into use, in this country. Its capacity is 10,000 cubic feet per hour; and there are points of interest about its construction and working capability. The principal problem that was before the makers was that the pressure of the gas might vary from a few inches of water up to 10 lbs. to the square inch, and correct registration was desired of the gas passing in bulk at any pressure varying within these limits. The solution of the problem has been arrived at in a manner that, so far as our recollection serves, is absolutely unique. The meter is fitted with their patent compensating index, in conjunction with which is ananeroid; and by this means, however much the pressure varies, accurate registration is ensured. Another interesting point is that the meter is fitted with a compensating water chamber, containing sufficient storage capacity to supply water for six months. A special pump is also provided for filling the compensating chamber while under pressure. There again in the ordinary way such a condition cannot be obtained.

The photograph illustrates what is shown more eloquently by the original, that Messrs. Parkinson and Cowan have made the meter very strong, and that good work has been put into it. The last remark is really unnecessary, after mentioning the name of the makers. The approximate weight of the meter, without water, is 5 tons.

THE DESSAU VERTICAL RETORT MODEL.

We reproduce below a photograph of the model of the Dessau vertical retort which was on show at the National Gas Exhibition at Shepherd's Bush. The model formed quite an attraction during the run of the exhibition; and it may be pointed out that the arrangement shown is that of a bed of eighteen 4-metre retorts.



Institution of Water Engineers.—At a recent meeting of the Council of the Institution, Messrs. H. Jefcoate Atkinson, W. Mark Cross, and Launcelot Paul Marshall were elected members; Messrs. Percival Clement Beeston, Cecil Burton Ede, Douglas Christian Watson, and George Whitaker, associate members; and Messrs. Colin Clegg, Henry Robinson, and William Wells were transferred to the class of member.

Midland Junior Gas Association.—By permission of the Birmingham Gas Committee, a visit will take place next Saturday to the coke-ovens and Mond gas plant at the Saltley works. On arrival, the members will be received by the Engineer (Mr. W. Chaney); and at the conclusion of the inspection, the party will take tea in the Recreation Room, on the invitation of Alderman J. H. Lloyd, the Chairman of the Works Sub-Committee.

The Funeral of Mr. C. E. Botley.—The great respect in which the late Mr. C. E. Botley was held in Hastings was testified by the large number of persons who witnessed his funeral on Monday last week. The mourners were conveyed to St. Clement's Church in nineteen carriages, and the beautiful floral tributes in two others, which were open. The *cortège* was joined by 150 of the staff at the gas-works. In addition to the members of the family, there were present the Chairman of the Gas Company (Dr. G. G. Gray, J.P.), all the Directors, with one exception, and the principal officials of both the Company and the Corporation; Mr. J. S. Garrard and Mr. Ticehurst, representing the Eastbourne and Battle Gas Companies; Mr. W. M. Mason, the Secretary of the British Commercial Gas Association; representatives of Freemasonry; and personal and professional friends of the deceased. The coffin was borne into the church by four of the Company's foremen (Messrs. Willett, Thomas, Tanner, and Burgess); and the service was conducted by the Rev. H. C. B. Foyster (Rector) and the Rev. W. A. Armstrong (Vicar of Christ Church, Blacklands)—the former attending the final rites at the Borough Cemetery, where the interment took place.

IMPROVING THE FUEL ACCOUNT.

By a Works Engineer.

Almost equal in importance to a large yield of gas per ton of coal is a high production of coke—in fact, the coke made for sale per ton of coal may conceivably be of greater value than the gas made from the same ton of coal. If, for instance, coke be valued at 10d. per cwt., and a yield of 11 cwt. be obtained after providing fuel for furnace use, it will be seen that the coke from one ton of coal will fetch 9s. 2d. Whereas if the make of gas be 14,000 cubic feet per ton, of which (say) 13,000 cubic feet are sold, and if the cost of manufacture—*i.e.*, cost into holder—be 8d. per 1000 cubic feet, it will be evident that the value of the gas obtained per ton of coal will be 8s. 8d.

The value of coke and the cost of making gas obviously vary within comparatively wide limits; but it would not be hard to prove that in the majority of cases it is more profitable to increase the yield of coke by 1 cwt. per ton of coal than to obtain an extra 1000 cubic feet of gas. Generally speaking, engineers are alive to this fact; but it is nevertheless advisable to preface an article such as this by drawing attention to an aspect of the case which may, in some cases, have escaped notice. In regard to this particular matter, the writer has knowledge of a works where the cost of making coal gas is 5½d. per 1000 cubic feet. The gas sold per ton is 13,000 cubic feet; while the coke made for sale is over 11 cwt., which at the present time is valued at 11d. per cwt., less loading expenses. On this basis, the gas made for sale is worth about 6s.; while the coke is worth 9s. 9d.

The writer's experience in this matter of coke made for sale has led him to consider that no engineer should be satisfied unless he can obtain a yield of 11 cwt. of coke for sale per ton of coal, in addition to coke breeze and pan breeze. This statement does not apply to small works nor to those cases where inferior coals are carbonized, but rather to moderate and large works using coal of a quality equal to second-class Durham. Some engineers are able to satisfy themselves, that even with the best settings and good coals, a make of coke of 10 cwt. for sale per ton of coal is quite satisfactory. This should not be so; for it is more than likely that if they were to insist on their settings being skilfully managed in all the many details the result would be a yield of an extra hundredweight of coke per ton.

Many engineers are too prone to blame the cost of coal and oil, the weather, and trade for bad half years, instead of attributing them to the results of their own work. There is so often too much of haphazard management and too little of scientific and methodical treatment of the retort-settings and other plant. To obtain good results, a careful study of all the various details which go to make up a high figure is essential. It cannot be done by sitting in the office and telling the foreman to do it. A very useful preliminary step is to take note of those undertakings whose figures you envy in this respect, and arrange to pay a visit, with a view to gleaning all the help possible from the methods adopted there.

Many a valuable hint has been given and taken in a friendly visit to another engineer's works, or in conversation at a meeting. A search through the Technical Press with a view to reading all written on the particular subject over a number of years is another preliminary step which is always productive of helpful information. It is advisable to study a subject in this way prior to making any drastic alterations in a works, as it is obviously preferable to leave alterations of existing methods until the subject has been thoroughly investigated.

What is "Coke Made for Sale"?

To make quite clear what constitutes the coke made for sale per ton of coal, it will be advisable to mention in detail its component parts:

1.—Large, broken, and small coke sold.
2.—Coke used in water-gas plant and boilers.
3.—Coke used for any other purpose on the works other than for heating retort-settings.

The next point to consider is: What is coke and what is breeze? The writer is of opinion that a better term for "breeze" would be "coke dust," and for the purpose of this article he would point out that the figure named—11 cwt. of coke per ton of coal—is intended to include all coke above the size of coke dust—that is to say, ½ inch and above. Pan breeze, by which is meant furnace ashes, is of course excluded. This is mentioned for the reason that such material, when washed and picked clean, is often saleable at a price nearly as high as that of coke; but it should always be sold as breeze and not as coke. To some, this figure of 11 cwt., named as a standard, may seem high; but to others it will appear to be but the result of ordinary and good work. Having cleared the reader's mind of doubts as to the details of what is included in the "coke made for sale," the writer will now proceed to point out the various directions in which economies may be gained.

Regenerators.

First and foremost is the use of a good type of regenerator furnace. Without this, very little can be done. It is unnecessary to mention any particular type or types of furnaces, as the writer considers that there are a number which will give excellent results. It is usually not so much the fault of the design of a furnace as the way it is worked which is most liable to give dissatisfaction. Should, however, there be any bye-passing of flues, it is quite impossible to get good work out of such settings. Fortunately, the draught in waste-gas and secondary-air flues is very similar; so that it is quite possible the effect of any small leaks would not be observable. But anything in the way of a large crack between the two flues would be disastrous to good working. Too much care cannot be taken in the building of regenerators—and also in putting them to work; for a regenerator of good design and of a well-built type should last at least twelve years, in which time it should pay for itself every year. There is, therefore, abundant reason for taking no end of pains to adopt a good type, and in supervising the work during erection.

In the writer's experience, he has found that with simple generators of full depth it is difficult to obtain a yield of coke for sale much in excess of 9½ cwt. per ton of coal. With such furnaces, a yield of 10 cwt. would be very good indeed. It is quite possible that with a generator of the best type the figures mentioned—viz., 9½ and 10 cwt.—could be exceeded; but in this case reference is made to settings in which two generators of small size are fitted to each setting of ten through retorts. To obtain a yield of 11 cwt. it is imperative to use good regenerative furnaces. So superior are these furnaces to those of the generator type, that an improvement of 1¼ to 1½ cwt. of coke made for sale per ton of coal may well be anticipated. This substantial increase is not so surprising when due consideration is given to the fact that the waste gases, instead of passing to the chimney at a temperature of (say) 1700° Fahr., as in a generator setting, are reduced in temperature to about 1100° Fahr. in passing through the regenerator flues. Thus 600° Fahr. of the sensible heat of the waste gases is utilized in heating the incoming secondary air, all of which heat is returned to the setting.

Size of Furnace.

Another important point which, in some cases, is overlooked is that the furnace (and this applies to regenerators as much as to generators) is of too small a size. There is no greater mistake. The writer has come to the conclusion that this is a matter of great importance. To start with, a furnace should be as wide as possible. A furnace of 3 ft. 6 in. in width is much better than one of 3 feet. The reason that this is so is that clinker of (say) 6 inches in thickness may readily arch-over a furnace of 3 feet wide in a homogeneous mass, but is probably not strong enough to support itself over a distance of 3 ft. 6 in. As a result, it is more likely to break up and rest on the fire-bars. In this state, it is much more open to the admission of air, and is more easily cut up and pulled out when clinkering—in fact, it may drop of its own accord when the fire-bars are removed. For this reason the furnace works better.

Again, the length of a furnace is limited to the distance over which a man can use a clinkering tool. If this distance be too great, the clinker at the back cannot be cut off, owing to the tool bending when in use. If, again, the tool be made of stouter material, it is too heavy for the man to use. Thus the length is strictly limited, but not so the width, which should be as great as possible. With furnaces of large grate area, the primary air is enabled to pass up through the fuel at a slow speed; and this has an important bearing on the quality of the furnace or producer gas made. A slow velocity enables the air and carbon to combine more completely to form carbon monoxide instead of carbon dioxide. Fuel which is converted to carbon dioxide is only doing half duty; so that this question of the slow velocity of primary air is of great importance. In addition to this, there is a further advantage in a slow velocity of air in the direction of the formation of clinker.

With a strong draught—*i.e.*, high velocity of air—a large proportion of the ash in the fuel burns to clinker; while with a low velocity it burns to ash. The former prevents the ready admission of air; while its removal requires the expenditure of much labour. The removal of ash, on the other hand, is a small matter and occupies but a few moments of the stoker's time, and, moreover, does not prevent the ingress of air to anything like the same extent as does clinker. The writer some time ago was visiting a small works on the sea coast, and, among other things, he noticed that provision had been made for inserting additional retorts to each setting, so soon as the consumption had grown sufficiently. For this reason exceptionally large furnaces had been provided. Having been for a long time in favour of large furnaces, the writer questioned the manager as to the effect of the furnaces; and he was informed that practically the whole of the fuel burnt to ash (no clinkering, but only pricking-up, was required), while the draught through the primary-air slides was hardly perceptible. As a result, the heats were good, the fuel account was low, and the labour in attending to the fires was infinitesimal.

As a further instance of the beneficial effects of large furnaces, the writer has close experience of two retort-houses, in one of which the settings are fitted with ten through retorts, and in the other with seven through retorts. In both houses the furnaces are virtually of the same size; but while in the case of the former they are too small, in that of the latter they are of ample size. As a result the clinker in the one house is excessively hard, clinkering is done every twenty-four hours, the producer gas contains too much carbon dioxide, and the consumption of fuel is heavier than it should be. In the other house, the furnaces are clinkered every forty-eight hours, and even then the clinker is not very hard,

nor is there much of it. The producer gas, too, is decidedly better, and the fuel account is satisfactory.

In the writer's opinion, the grate-area of a furnace is of equal importance in the retort-house as the area of the boxes in the purifying-house. The depth of a furnace is another factor of importance, but not to the same extent as the grate area. There is no question, however, but that a furnace should be constructed of a good depth; for it is an advantage that a furnace should be filled as few times as possible in the twenty-four hours. This saves labour; while a good depth of fuel results in the production of a regular and satisfactory quality of furnace gas.

Regulation of Slides.

The regulation of the air-slides must obviously be carefully carried out if good results are to be obtained. Some, however, appear to attach too much importance to this matter and too little to the every-day working, such as the cleaning and filling of the furnaces, the cleaning of the flues, and the maintenance of the settings in good condition. In fact, they make a fetish of the analyses of the gases and seem to think that if they get good tests, everything else should be satisfactory. The testing of the waste gas is a help, but no more. It is quite possible to get good tests with bad heats. A testing apparatus does not tell you whether the volume of the furnace gases is sufficient to heat the retorts—it merely tells you whether the quality is right. Even then, unless the quality over the whole period from one clinkering to the next is ascertained, it is difficult to make full use of a test, as it will be largely influenced by the state of the fire. Allowances must be made for this factor. In regulating the damper and air slides, it must be remembered that the damper should be opened very little, so as to obtain, if possible, a pressure in the combustion chamber. The tendency should always be in this direction—that is to say, it is often worth while to attempt to close the dampers and increase the primary-air slides. This lowers the velocity of the air, and gives a good diffusion of heat throughout the length of the retorts.

It is only possible to arrive at the correct amount of opening for primary air by a process of trial until the required heat is obtained. In setting the secondary-air slides, it is possible to determine the approximate amount by closing them in until a decided blue flame appears at the outlet of the waste-gas flue when the cleaning plug is opened, showing that the air is burning the carbon monoxide not previously consumed in the combustion chamber. Then open them out gradually until the blue flame disappears. Having obtained this point, it is advisable to open them a further—say, 10 per cent.—to ensure the admission of sufficient secondary air to burn all the furnace gas. Besides, it does not follow that because no blue flame is visible that no carbon monoxide is present. As a matter of fact, should a small percentage be present in the waste gas, it is insufficient to burn—at any rate so as to be visible to the naked eye. This method will, at least, give the approximate position for the secondary air opening.

To obtain the best possible opening, however, it is necessary to make daily observations of the heat in the settings, carry out series of tests, and only be satisfied when good heats tally with good tests. It is, of course, of no use to be satisfied with good heats unless the proper quantity of coal is being carbonized. The admission of the correct quantity of secondary air is sometimes most mysteriously unaccountable. The writer has known cases where, according to tests, sufficient secondary air was being admitted, and yet an undoubted improvement was made in the heats by increasing the size of the secondary-air openings. This has been noticed on not one, but several, occasions, and the writer is now always alive to the possibility of improving matters by increasing the secondary air. As a matter of fact, he would be glad to hear whether others have had a similar experience.

(To be continued.)

WORKS TOPICS.—V.

By "Modus Operandi."

A great deal has been written on the question of apprenticeship. The advantages and disadvantages of the system are fairly well known. We are all also familiar with the excellent scheme inaugurated by the Gaslight and Coke Company for training youths for the gas-fitting trade. But so far we have heard nothing of any scheme for training lads to do the skilled work on the manufacturing side of the gas industry's business.

Training Lads for the Works.

A modern gas-works of any size requires competent men of all trades. These men are engaged to carry out the work in up-to-date fitting and machine shops, and in well-arranged carpenters' and smiths' shops. Platers, bricklayers, painters, and the general works fitters, who erect retort-settings and other gas-works plant, are all specially skilled men. Some have been trained by the company that employs them, while the majority, already trained, have been engaged to fill vacancies. In the case of the former, they have usually become competent workmen by reason of their own personal exertions when employed as labourers to a skilled man. If incapable, they remain as labourers for the rest of their lives.

At the same time, it is not satisfactory that there is no recognized system of training lads to fill these places in gas-works. The training, in the vast majority of cases, is a purely haphazard one. A proportion—and a small proportion only—of young labourers have sufficient sense and gumption to learn the trade of the skilled man to whom they act as "mate." A good deal depends on the skilled man himself. Many have the trade unionist idea of protecting the interests of their colleagues of the same trade by deliberately withholding any instruction, and do all they can to prevent their mate from learning the trade. In many cases, too, a mechanic's labourer, for one reason or other, is shifted to some other job, and does not remain long enough with one particular tradesman to learn the trade—for it takes fully four or five years for a young man of only average ability to really learn any of the skilled trades.

Those who are familiar with the ordinary routine of a large gas-works will acknowledge that there is scope for a good deal of improvement in this direction. It is quite plain that what is wanted is the adoption of a scheme to engage young lads of 16 to 18, provided they are of the right material, to act as mates to the mechanics, carpenters, bricklayers, and general works fitters. Give them continuity of employment in one trade, and further give them opportunities of attending evening classes, and we shall then hear less of trade unionist ideas in gas-works, and we shall have growing-up properly trained men, and men who will have the traditions of the company that employs them thoroughly ingrained in their minds. All must have noticed the difference in good will between the man who has worked since a lad in one employ, and the man who is "taken on" in later years. Is it not, therefore, better to train the men in our own works wherever possible?

There is no difficulty in adopting such a scheme. It merely needs a little personal attention on the part of the manager, who should take special pains to engage the most suitable class of lad. The latter should then be given every opportunity of becoming proficient in one practical trade, acting as "mate" to some skilled man, and replacing the old type of labourer. The lad will be paid, say, 12s. a week, and be given every year 2s. or 3s. a week increase in wages if he proves satisfactory. He should be a well-grown, strong lad, so as to enable him to take efficiently the place of a labourer of more mature years. There is, of course, a financial advantage in adopting this plan, which should not be overlooked, as in a very short time the lad is usually quite as efficient a mate as a grown man.

It is now two years since the writer of these notes adopted this scheme; and he has been thoroughly satisfied with the result. Some eight or nine lads have been engaged, and only in one case has there been a failure. The idea is well worth consideration.

Works Lighting.

The lighting of a gas-works is oftentimes far from being an advertisement for gas lighting. Why this is so is by no means clear, unless it is for the same reason that a shoemaker's children are always the worst shod. High-pressure gas lighting lends itself admirably to the work in question. In such dusty places as gas-works, maintenance is, of course, of great importance; but this is so in any case, even with low-pressure burners. It must not be overlooked that one high-pressure light will often replace a dozen low-pressure incandescent burners; so that there is, in such a case, only one burner to maintain instead of a dozen. For this reason it is quite possible that, in replacing low-pressure burners by high-pressure, there might well be a saving in cost of maintenance. Apart from this, the advantage in lighting is immense, especially in large buildings such as a retort-house; for, by using so high a unit of light as 1500 or 3000 candle power, it is feasible to place the light a good distance away from the smoke and dust produced during the "draw." The initial cost of lighting a building is also no higher where high-pressure is used, for one lamp will usually take the place of three or more low-pressure lamps. Altogether there are very substantial advantages in adopting this method of lighting a gas-works. For the lighting of works' gates they are excellent, and the same statement applies to the lighting of all yards, jetties, wharves, engine-rooms, shops, retort-houses, and in fact all parts of the works.

The advantages of good lighting are so obvious that such a matter need not be emphasized. Indeed the only excuse for raising the point is that it is quite uncommon to see high-pressure lighting in the works, however much used on the district. In this connection there is some advantage in using high-pressure air instead of high-pressure gas, especially in dusty places; for by this means no dust is taken in by the air for combustion. Since air and gas are both entering the burner through pipes, instead of gas only, it is obvious that much less dirt is drawn into the burner and mantle. For retort-houses such a system is well suited. Therefore, in considering a scheme of lighting for the works, the question of compressing the air instead of the gas should not be overlooked. It is a disadvantage that the compressing plant for air must be of greater capacity than for gas, but the saving in maintenance may well counteract any disadvantage in this particular respect.

Physical Society's Annual Exhibition.—We learn from the Secretaries of the Physical Society of London that this exhibition will be held on Tuesday, Dec. 16, at the Imperial College of Science, and will be open both afternoon and evening, as before.

THE AMERICAN GAS INSTITUTE MEETING.

[COMMUNICATED.]

"ON to Richmond," was the war cry of the North half a century ago; and from the Southland every able-bodied man came forward to meet the invaders. After many days, and under happier skies, Richmond is again the meeting place of North and South, assembling in national conventions. When the American Gas Institute decided to hold its eighth annual meeting in the old home of the Southern Confederacy, the news was received with pride by the Southern members and with pleasure by those of the North, in their anticipation of the delights of Virginia scenes and hospitality.

Certainly no day could have been fairer or had more autumn charm than Tuesday, Oct. 14, when special trains from West and North, passing historic battlefields, brought some 300 members and guests to Richmond in the late afternoon. From the South and other parts came 200 more; so the meeting, with a total registration of 500, compares well with previous gatherings.

In the evening an audience of 300 listened with intense interest to Dr. Charles E. Lucke as he traced the successive steps by which he has developed "Surface Combustion" until "it is now possible . . . to design apparatus (which) may be produced in no more time than is necessary to decide on the models to be manufactured." Broilers, ranges, and room heaters fitted with surface combustion burners were in full operation, and received critical inspection after the rapid fire of questions and answers closing the lecture. There seems no obstacle in the way of extensive tests of these new burners under commercial conditions, and they apparently mark a distinct advance in the employment of gaseous fuels.

The formal sessions began on Wednesday morning at ten with an address of welcome from Mayor Ainslie, gracefully acknowledged by Mr. C. M. Cohn. Then followed the adoption of the report by the Board of Directors. They asked permission to accept, when completed, the report of the Committee on a Uniform System of Accounting. It is hoped that the system proposed will so commend itself to the gas industry that it will be widely adopted. Until our gas companies agree among themselves upon one accounting system, it is useless to expect any uniformity on the subject on the part of State Commissions.

The report of the Membership Committee showed the election of 139 members, and an existing roll of 1466. The yearly income exceeded expenses by $1000.

At the conclusion of these business details the chair was taken by the First Vice-President, Mr. J. M. Morehead, while the President, Mr. W. R. Addicks, delivered the annual address. He spoke of the great success of his plan of obtaining funds for sending the "Institute News" to non-member gas company employees. In this way over 1000 are benefiting by the educational articles in the "News," which form a preliminary to the Gas Educational Course. He recommended creating additional standing committees so as to ensure the proper consideration by the Institute of every phase of the gas industry. He further called attention to the ever-increasing importance of abolishing high candle power requirements.

The report of the Gas Educational Fund disclosed a student membership of 91; and $500 was voted to the fund. Then many administrative committees' reports were heard, including that of the Technical Committee. The latter called attention to the practice followed for this meeting of preparing abstracts of all papers, and to the importance of broadening the scope of the Institute meeting.

By the adoption of the report of the Committee on Thermal Value and Candle Power, the Institute put itself on record for the first time as being in favour of a calorific standard. The report was mainly an approval of the work of the Joint Committee on Calorimetry of the Public Service Commission and the gas companies in the Second Public Service District of New York State. This is another step in the endeavour to discard worn-out illuminating power standards. Following this action, Mr. C. H. Stone read his paper on "The Percentage of Gas Used in Mantles and Heating Appliances." This showed, as a result of a careful canvass of a community having 1139 consumers, that probably 90 per cent. of the gas was so used that the calorific power only was of value. In the ensuing lively discussion, there was unanimity as to the uselessness of high candle power, and various suggestions were made as to how to hasten the conversion of existing flame burners to the mantle type.

The afternoon session opened with the presentation and adoption of Mr. W. J. Serrill's report on the "Utilization of Gas Appliances." Its most important recommendation was "Standard Specifications for Gas-Fixtures;" and now there is national sanction for any gas company in its endeavour to improve the quality of the fixtures installed in the ordinary house.

Following this came the report from the Committee on Pipe Standards. This comprised specifications for the manufacture of cast-iron pipes and specials, and standard dimensions for flanged castings. The favourable action of the Institute brings within sight the time when the manufacture of all cast-iron pipes and specials will be governed by one standard throughout this great country.

After deciding on New York City for the 1914 meeting, the members listened to two related papers—"Closer Relationship between the Engineering and the Commercial Departments," by Messrs. Clare N. Stannard and Frank Q. Cannon, and "How to Establish More Intimate Relations between Departments in the Administration of the Gas Business," by Mr. R. C. Ware. From slightly different view points, both treated of the impossibility of the best service to consumer and efficiency of operation without close co-operation between all departments. Plans for securing co-operation were suggested by the writers and supplemented in the discussion.

Here the paper order was interrupted to hear from the Nominating Committee. Their report, received with great applause, resulted in the election of the following officers: President, W. H. Gartley. First Vice-President, W. E. M'Kay. Second Vice-President, R. C. Dawes. Secretary and Treasurer, G. G. Ramsdell. Directors (two years), Paul Doty, C. H. Graf, W. S. Blauvelt, A. E. Forstall, Carroll Miller; (one year), G. T. Macbeth, H. L. Rice.

Notwithstanding the absence of Mr. Alten S. Miller, his paper on "Gas-Rates" was discussed at length, though none of the speakers were very hopeful as to an early change in our system of uniform prices by virtue of which one-third of the consumers furnish all the profits.

"Accidents: Their Causes and Prevention" by Mr. J. B. Douglas, the Manager of the Claim Department of the United Gas Improvement Company, was illustrated by many lantern slides of actual hazards around gas-works, and its inclusion in the programme is significant of the widespread interest in accident prevention. The presentation and following discussion occupied an hour, and closed at six the first day's proceedings, marked by long hours and good attendance.

On Thursday the meetings were held in two sections—"A" for manufacturing, and "B" for distribution subjects. The latter will be considered now; and as the first three papers were on correlated topics, they will be considered as a group. They were: "The Installation of Cast-Iron Street Mains," by Mr. Walton Forstall; "The Installation of Mains and Pipe Lines of Steel and Wrought Iron," by Mr. H. L. Rice; and "Street Main Standards," by Mr. G. I. Vincent. The first was an elementary treatise on its subject designed for the assistance of juniors; the second an exposition of the present art of high-pressure distribution; and the third a discussion of various standards of street main practice in both low and high pressure distribution. Being presented in abstract, only thirty minutes were taken in this way; while some two hours were occupied by lively discussion, which terminated only at the closing time. It was concerned mainly with the difficulty of making permanently tight cement joints on mains larger than 12 inches.

In the afternoon, Section B heard "Protection of Street Mains by an Adequate System of Inspection," by Mr. C. C. Simpson, jun.; and "Protection of Street Mains by the Intelligent Use of Underground Space," by Mr. J. A. Gould. The papers were discussed the together; and the first brought out various opinions upon the inspection necessary, the second the great difficulty found in securing for gas structures undisturbed possession of their original location. Then followed "Organization and Equipment for, and the Method of Handling, Street Leaks," by Mr. A. D. Whittaker—a report on the methods pursued in a number of cities.

Dr. C. H. Sharp and Mr. A. H. Schaaf, in "A Portable Electric Photometrical Standard; Its Construction and Use," offered what, in the opinion of many, will prove to be a very economical and convenient substitute for the pentane standard. "Automatic and Distance Lighters," by Mr. F. H. Gilpin, gave the results of many test installations, and contained data valuable to any one considering the use of such lighters. This closed the proceedings of Section B.

Section A opened with the report of the "Committee on Power Economies in Gas Plants," by Mr. C. L. Bruff. This—a most complete review of all the factors entering into the economy of steam production and of steam consumption—elicited a long and valuable discussion. "Handling, Storing, and Sale of Coke," by Mr. J. W. Shaeffer, was equally valuable in its own province, and was adequately discussed. With the renascence of coal gas, coke looms again to the fore.

Lack of time cut short the remarks on "Liquid Purification of Coal Gas," by Mr. J. G. O'Neil; but his process will undoubtedly receive close attention, as a successful method of liquid purification has long been desired, though many failures have caused each new claim to be received with scepticism. This morning session of Section A exemplified, as fully as did the corresponding session of Section B, the great advantage of allowing ample discussion time by insisting on the presentation of each paper by abstract. The Bruff and Shaeffer papers were presented in eighteen minutes, and were discussed for about one and three-quarter hours.

In the afternoon, Mr. W. H. Fulweiler gave "Some of the Physical Characteristics of Ferric Oxide"—an exposition of the great influence of physical characteristics on oxide efficiency. Following came Mr. Herman Russell's report for the "Committee on Progress in Carbonization Methods" illustrated by many lantern slides of the varied carbonization systems described. In the discussion (cut short for lack of time), one of the speakers, who was listened to with pleasure, was Mr. Duckham. The subject of the report is so important, and a decision by any company between various systems involves so much capital, that the works

engineers could hope to receive from any discussion, however prolonged, only ideas for future investigation.

The report of the "Committee on the Naphthalene Problem of To-day" received only a word of discussion, because of the closing hour; but it contains information of interest to every maker of coal gas.

On Friday morning, the Institute met as a whole to complete the consideration of the papers left over from Section A. "Some Notes on the Carbonization of Coal in Vertical Retorts," by Mr. O. B. Evans, describes certain experiments, and contains "an argument based on these experiments giving the proportion of gas travelling through the core of the charge and through the coke." Its conclusion, supplemented by measurements taken since the paper was printed, is that considerably more than half the gas goes through the coke. It will undoubtedly be read with great interest by all concerned with vertical retorts.

"The Behaviour of Water in Gasholder Cups," by Mr. H. W. Alrich, is not a subject that lends itself to general discussion; but it will tend to improve this feature of holder design. It was followed by the report of the Public Relations Committee and its Sub-Committee on "Circular 32." Both of these reports were read by Mr. J. B. Klumpp, and were concerned, the first with the relations of the companies to regulatory commissions, and the second with the circular just issued by the National Bureau of Standards on model regulations for gas supply.

After the usual vote of thanks to those responsible for the success of the meeting, the President (Mr. W. R. Addicks) introduced the President of the Illuminating Engineering Society (Mr. C. O. Bond), and asked him to preside over the joint session of the Institute and Society. The meeting listened to two papers presented by members of the Society: "The Importance of Direction, Quality, and Distribution of Light," by Mr. M. Luckiesh, and "Some Phases of the Illumination of Interiors," by Mr. P. S. Millar. Both were illustrated by demonstrating booths, presenting in great variety a succession of changing objects. Although these lectures had been delivered a number of times elsewhere, they were new to most in the audience; and at their conclusion the feeling was general that the information obtained as to the possibilities of effective illumination would be of the greatest value in pushing the sale of gas, and that the Institute was deeply indebted to the Illuminating Engineering Society and to the lecturers for the great trouble involved by the demonstrations.

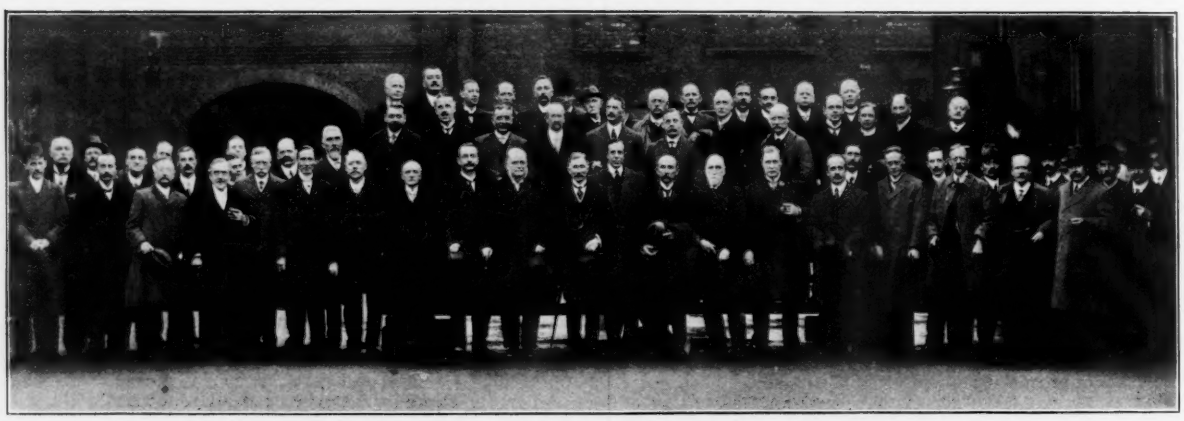
In the absence of Mr. C. A. Luther, the paper "Gas Lighting of Interiors" was received as printed; and the joint session ended, and with it the business of the convention. Nothing but praise was heard for its technical side, and especially appreciated was the amount of discussion time resulting from abstracting the papers. It has been conclusively shown that the members will talk if they have the opportunity; and the incident of two years ago, when an author was allowed for fifty minutes to read (in a voice inaudible beyond ten feet) from a printed copy of his paper, thus monopolizing all the time available for discussion, would not now be allowed in an Institute meeting.

From the social side, the meeting was unique; but its success here may never be repeated. We have been to many cities and welcomed by many mayors, but in Richmond each member and man and woman guest was treated as the personal friend of their hosts and hostesses. The women were entertained at the County Club, and also by the Governor's wife at the Executive Mansion. On Wednesday evening, a reception to the members and their guests was tendered by the City of Richmond; and this and the subsequent entertainment and dance were pervaded with that personal note of interest and Southern hospitality never before experienced. On Thursday night, the banquet was honoured by Governor Mann, of Virginia, whose eloquent discourse on American spirit, as exemplified by both North and South in the Civil War, was enthusiastically applauded.

A golf tournament on Friday afternoon, played on a beautiful course under a sky of Autumn haze, ended auspiciously a gathering which Nature vied with man in making memorable.

A GLOVER-WEST VERTICAL RETORT INSTALLATION AT SOUTHPORT.

Description of the New Plant.



THE VISITORS AT THE SOUTHPORT GAS-WORKS LAST WEDNESDAY.

[Mr. John West (in the centre of the front row) had Mr. Alderman Trounson, of Southport, standing on his left side, and Mr. Councillor Kay, of Manchester, on his right.]

On Wednesday last, there was inaugurated at the Southport Corporation Gas-Works a vertical retort installation on the Glover-West system of continuous carbonization, a general description of which is appended.

The installation of Glover-West vertical retorts has been erected on a site formerly occupied by eight settings of horizontal retorts, and at one end of an existing retort-house, a portion of which has been remodelled to accommodate the new plant.

The new vertical retort-bench contains five settings of eight vertical retorts, arranged to be heated in units of four retorts—making a total of forty retorts, of a nominal capacity of 1¼ million cubic feet of gas per day.

The coal for the vertical retorts is supplied from an adjoining coal-store, and is received by a mechanical feeder and elevator, which elevates the coal to a push-plate conveyor over the coal-bunkers, which are of a capacity sufficient for 24 hours' supply to the retorts. From these coal-bunkers the coal gravitates to coal feeding-hoppers and to the retorts, through which the coal continuously descends, and during its descent becomes completely carbonized into coke by the time it arrives at a point at the base of the retorts.

Each retort setting is provided with a gas-producer having outlets to each half of the retort-setting.

The gas from the retorts passes through a collecting main to a foul-main alongside the retort-bench; a retort-house governor, with bye-pass and tar seal-pot, being provided at the end of the bench.

The coke, after passing through the lower ends of the retorts, is cooled by the secondary-air supply in the manner peculiar to the Glover-West system of continuous carbonization. The residual coke, which is received by the coke-chambers at the base of the setting, is periodically discharged in a cool state from these chambers to a West conveyor, which takes it to the end of the retort-bench, where it is received by an elevator for raising it to a hopper that supplies the coke to an electric telpher transporting plant. This conveys it to an installation of coke storage-hoppers, provided with screening plant and outlets, arranged for filling railway waggons and to carts for the general coke trade at the works. The coke for the producers is elevated to the telpher, and stored in a hopper placed in a convenient position for supplying the producer charging waggons.

The coal elevating and conveying plant is driven by a gas-engine of 14½ effective H.P. The coke-extractors are driven by a gas-engine of 6½ effective H.P. These two engines are provided so that one acts as a stand-by to the other. The coke-conveyor in the retort-house is driven by a gas-engine of 10 effective H.P.; and the electric telpher plant and coal-elevator are driven by electric motors—the current being continuous and of 220 volts.

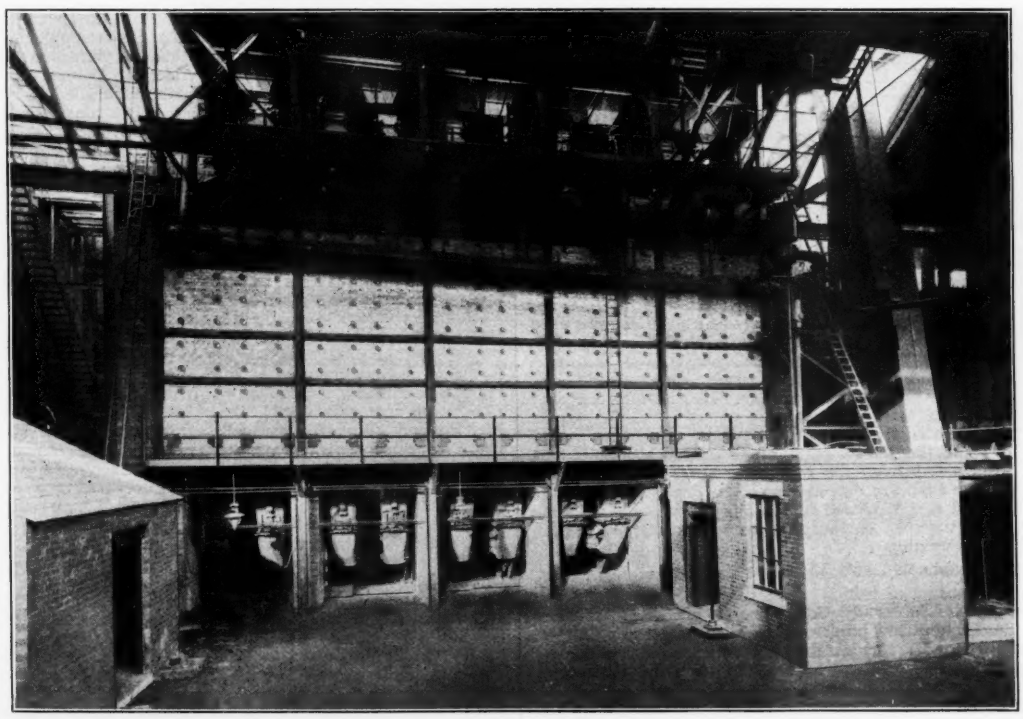
The telpher coke-transporting plant is also arranged to convey the coke from the existing horizontal retorts in the other portion of the retort-house.

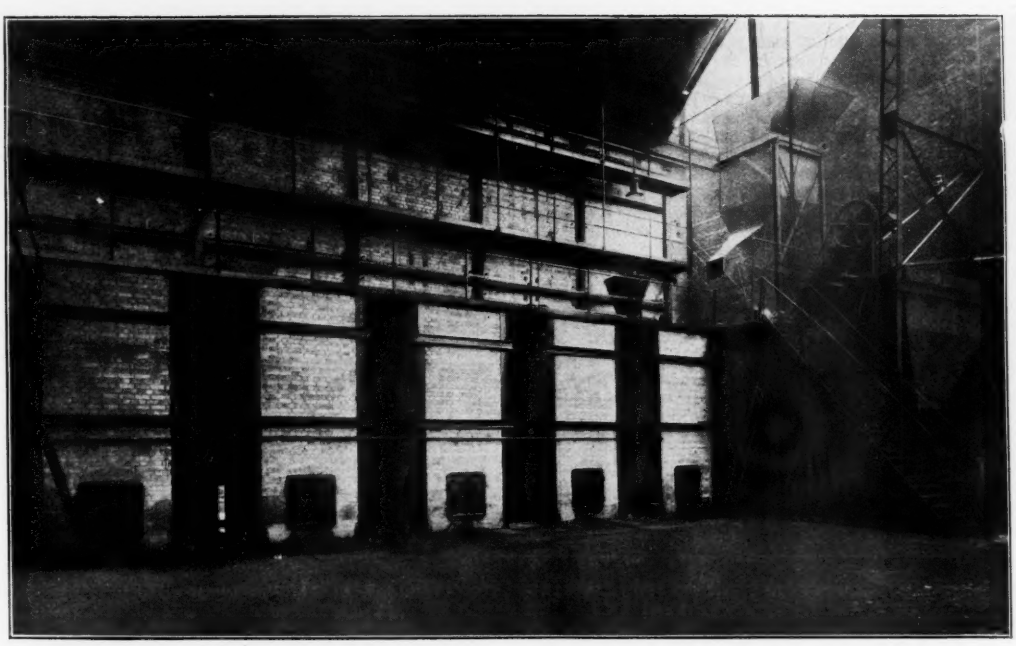
For inspecting and attending to the various parts of the retort plant, there is ample provision of staircases and platforms.

In conclusion, it may be mentioned that the whole of the plant was designed to the specification of Mr. John Bond, the Gas Engineer to the Southport Corporation; the contractors for the Glover-West vertical-retorts and coal and coke handling plants in the retort-house were West's Gas Improvement Company, of Manchester; and the telpher transporting plant was supplied by Messrs. Strachan and Henshaw, of Bristol.

The Inaugural Celebrations.

Invitations to inspect the new plant were extended to a number of Lancashire, Cheshire, and Yorkshire engineers, as well as to other gentlemen prominently identified with the profession. The visitors were cordially welcomed at the Crowland works by the Chairman of the Gas Committee (Alderman E. Trounson, J.P.), the Vice-Chairman (Alderman W. H. Hayes), the Gas Engineer (Mr. John Bond), the Assistant-Engineer (Mr. R. Walmsley), and the Outdoor Superintendent (Mr. J. E. Blundell). A very interesting hour-and-a-half was subsequently spent by the company in inspecting the new installation, the practical value of which was certainly heightened by the presence at Southport of the co-inventors—Mr. John West, of Manchester, and Mr. Samuel Glover, of St. Helens.





THE GLOVER-WEST INSTALLATION OF VERTICAL RETORTS AT SOUTHPORT.

Souvenir for the Chairman.

In asking Alderman Trounson to inaugurate the new installation, Mr. John West said the new retorts would have a nominal capacity of 1¼ million cubic feet per day. The bench contained five settings of eight vertical retorts, arranged in units of four; making a total of forty retorts. He briefly explained the system, and afterwards requested Alderman Trounson to open the door of the engine-house with the key with which he had pleasure in presenting him as a memento of the inaugural ceremony. The inscription on the key was:

> Presented to Alderman E. Trounson, J.P., Chairman of the Southport Corporation Gas Committee, on the Occasion of the Inauguration of the Glover-West Vertical Retorts, Oct. 28, 1913.

Alderman Trounson briefly responded; remarking that Mr. West was no stranger to them. He sincerely hoped that the new

verticals would not only realize expectations but surpass them. There would be plenty of time for speech-making later on. Many of his colleagues were interested in the new installation; and he had much pleasure in starting the engine.

The Speeches.

The visitors were subsequently entertained at dinner at the Queen's Hotel—Alderman Trounson presiding over a large gathering. Among those present were the Mayor (Councillor Harold Brodrick, M.A.), Alderman T. P. Griffiths, J.P., and other well-known members of the civic authority.

After the loyal toast had been duly honoured,

Mr. Bond read a number of letters of apology for non-attendance, and said he hoped that these gentlemen would, if they so desired, avail themselves at any time of the opportunity of inspecting the new installation.

Mr. Samuel Glover (St. Helens) proposed the toast of "The County Borough of Southport." He felt highly honoured, coming as he did from the neighbouring town of St. Helens, to be entrusted with so important a toast. Southport, perhaps, might not like to be claimed as a neighbour of St. Helens; but he assured them that St. Helens claimed the acquaintance. After stating that the present population of Southport (including Birkdale and Ainsdale) was between 70,000 and 80,000, he went on to compliment the town on its enterprising methods. Clearly in the amalgamation with Birkdale they realized that unity meant strength. He assured them that Lancashire people generally had watched the growth of the borough with genuine interest. Southport had always been looked upon as a progressive community. It was like an advancing army—always on the move; and its enterprise was appreciated not only in Lancashire but in other parts of the country. They deeply sympathized with the town in the loss sustained by the recent destruction by fire of the beautiful Market Hall; but he had no doubt that, with their usual perseverance, the Southport authorities would build an even better place, which would rise, phœnix-like, from the ashes of its predecessor. He asked the company to cordially pledge the toast.

The Mayor acknowledged the toast in similar terms. He thanked Mr. Glover for expressing the sympathy of the visitors with Southport in the loss sustained through the recent disastrous fire. It might, however, prove a blessing in disguise, and turn out to be one of the best things that had ever happened in Southport; for it had been the means of bringing together shopkeepers, property owners, and ratepayers in general sympathy.

Councillor Kay's Vigorous Speech.

Alderman Trounson, in calling upon Councillor W. Kay, J.P. (Chairman of the Manchester Gas Committee), to give the toast of the "Southport Gas Committee," observed that in gas engineering circles it was recognized that Mr. Kay was a very worthy successor to the late Alderson Gibson, of Manchester, who held the office of Chairman for so many years with distinguished success.

Counciller Kay, who was cordially cheered, said he was greatly privileged to be entrusted with this important toast. Is was one of the pleasant duties which occasionally fell to the lot of of public men. He was pleased to be with them that day, and to witness the inauguration of the new vertical retorts. As a Lancashire man, he was also pleased to know that a Lancashire plant had been installed. He had had the privilege and advantage of seeing most things worth seeing on the Continent and elsewhere in the way of carbonizing methods, and assured them that he was gratified that the Southport Gas Committee had recognized the undoubted advantages of the Glover-West continuous system of carbonization. He had heard with regret that Southport was as much backward as Manchester in that it looked upon its gas undertaking as a sort of milch-cow. He said this deliberately. He believed every department ought to stand on its own base; and if they carried this principle out, they would speedily see what would happen. Not only Southport but other municipalities had, for years and years, taken out of the pockets of the gas consumers millions of money. In Manchester more than £3,000,000 had been taken from the consumers. Could they, or anyone else, show to him, or to the consumer, any return for this money? They could not. They knew the old adage, "Easy come, easy go." They were putting this money into a bottomless pit; but what did they get in return? For seven years he was closely connected with the Manchester Electricity Committee, and claimed to know what he was talking about. What was wanted was to put the gas undertaking on a proper footing, and face the question as business men. "Levy a true rate," he proceeded, "and let the ratepayers know what they are paying for gas. Then give it them back again, and let them not forget that they enjoyed a monopoly." Manchester was the best example he could give them to illustrate his point. There they had about 14,000 consumers of electricity and something like 183,000 gas consumers. The large consumer of electricity was paying less than 0·45d. per unit. What was the result? They got multiplication of plant, certainly. But at whose expense? He entered the Manchester City Council twelve years ago, at a most critical time. He found that, through ill-advice, money was being wasted, and that they had more plant than they could find outlet for. The Electricity Committee immediately began the method of dumping their product. This was a policy which he approved of at the time, though he did not see where it was going to lead them. They were even dumping at a figure which showed a return of a little over running cost. The electrical engineers then said they had not sufficient stand-by, and that they wanted two more engines. How could business be done in this way, when the product was being practically given away? Let them put their electricity undertaking on the same footing as the gas undertaking, and they would soon see where they were. It behoved them at all times to remember that it was not a just thing to use a monopoly wrongly. They were using a monopoly in a manner they could not substantiate. He hoped that, when they were handling a monopoly, they would handle it with fairness to everybody concerned; and they must not forget the possibilities which were within grasp. The outstanding capital debt of the Manchester gas undertaking was lower than any other municipal undertaking, with the exception of one. Manchester's debt was 3s. 9d. per 1000 cubic feet of gas sold, as against the next, which was 6s. 6d. Manchester gas was the lowest price in Lancashire (excepting Widnes), if they took into consideration that they supplied consumers with free meters, free cookers, and low charges for the hire of gas-fires. On top of these advantages, they gave, as a Gas Committee, a sum of no less than £55,000 per annum to the relief of the rates. But he would infinitely prefer this to go to those who contributed to it. As a business man, he did not see why they should hand over so large a sum. The Gas Committee, of which he had the honour to be Chairman, always had in mind the one and only idea, and that was to reduce the price of gas as much as possible, so that it should be cheaper than coal. This could, and would, be done in the near future. They had doubtless heard a good deal about "smoky Manchester;" but he ventured to say that if the policy he enunciated were adopted, they would hear no more of it. At a recent lecture he heard at the National Gas Exhibition, an eminent scientist declared that the adoption of gas-fire appliances had been the means of giving the people more than 100 extra hours of sunshine—equal to twelve days. The late Alderman Gibson was the first to instal a Glover-West plant in this country outside St. Helens. He assured them that they would find not only a considerable saving in labour costs, but they would secure a greatly increased make of gas per ton of coal carbonized, coke of improved value, and an increase in residuals. Another important point he wished to emphasize was the entire absence of naphthalene. So pleased were they with the Glover-West installation at Manchester that ere long they would have another in the Rochdale Road works. In conclusion, he reminded the members of the local Gas Committee—and he was sure they would agree with him—that it was their bounden duty to do what they could to forward the undertaking, as by doing so they would benefit the citizens and ratepayers of Southport.

Alderman Trounson, who was greeted with hearty applause on rising to respond to the toast, said he felt somewhat embarrassed, because he recognized that he was surrounded by men who were the flower of the gas industry of the country. He did not, he assured them, take this as a compliment to himself, but to their Engineer, Mr. Bond, who next year would, in the usual course of things, succeed Mr. Edward Allen, of Liverpool, as President of the Institution of Gas Engineers. This, indeed, was not only a great honour to Southport, but a distinguished recognition of Mr. Bond's services. He was in cordial agreement with Councillor Kay in regard to profits from the gas estate being applied to the relief of rates. As a matter of fact, he had expressed himself strongly on the point for years past; but to-day he was stronger than ever in his conviction on it. The Southport Gas Committee had a very small beginning. They started with a capital of £3528, and the present capital was £307,000. The percentage in Southport towards the relief of the rates was even greater, proportionately, than it was in Manchester. During the last ten years they had devoted about £130,000 to this purpose. This year they had been called upon to devote another £1000, in addition to the average £13,000. One of the disadvantages they experienced at Southport was that they had a limited scope for extending their gas supply, for there were practically no industries. In the industrial towns the largest consumers were workshops and factories, which involved very little capital outlay by way of mains; but in Southport they had enormous lengths of service for mains. The Council, he acknowledged, had always given the Gas Committee a free hand; and they would try not to abuse the confidence placed in them. He believed the Council realized that the Gas Committee honestly tried to do all they could for the estate, and had in mind the fact that they were in friendly rivalry with another municipal estate—the electricity undertaking. Mr. Kay had referred to the lowness of Manchester's debt on outstanding capital expenditure Manchester's capital charges were indeed low; but he could assure them that when Mr. Bond came to Southport this was one of the first matters he brought before the Committee. The result of his efforts was that the capital charge had been reduced from 8s. to 6s. 8d. Speaking about gas-fires, and the prospects of a development of the business in Southport, he said his Committee confidently anticipated a great demand for the new pattern fires Gas fire construction had been revolutionized during the last two years. Many of them who had been to the exhibition in London knew that this statement was true, and that "revolutionized" was not too strong a word. There they saw the modern, up-to-date gas-fire patterns, which were the product of the cleverest research experts and chemists. Engineers would bear him out when he said that in Southport they had, in Mr. Bond, one of the cleverest research experts in the country. [Applause.] He had done excellent work in this department; and he assured him that his labours were highly appreciated. Before very long, they hoped to have some thousands of gas-fires in use in Southport. The Gas Committee also anticipated increasing business by developing the market for water-heaters. Personally, he thought they would be able to heat water by gas cheaper than by coal. Such a process would be far more cleanly and convenient, besides reducing the house work. The paper read before the British Commercial Gas Association by Mr. H. M. Thornton, on "The Development of the Use of Gas for Industrial Purposes," was one of the best he had ever heard. In it, the author enumerated a number of industries which might easily be induced to come to Southport; and it was to be hoped the matter would not be lost sight of. He was heartily glad that the installation they had inspected that day had been erected by a firm the head of which was a Southport man. Those who had the privilege of knowing Mr. John West knew perfectly well that he would never advise them to take a wrong step. He was delighted that Mr. West was present, and hoped for many years to come he would enjoy his residence among them. [Applause.]

Mr. J. G. Newbigging (Manchester), in proposing the toast of "Success to the New Works," said he was sure they all congratulated Mr. Bond and his Committee on their wisdom and foresight in selecting for the extension of their carbonizing plant the system of continuous carbonizing in vertical retorts. No one present that afternoon could have failed to admire the excellent quality of the structure and its business like appearance. It was excellent in every way. Therefore it was creditable alike to their Engineer and to West's Gas Improve-

ment Company, who were the Contractors. The firm of West had no such word in their catalogue as jerry. Everything they erected was the best that brains and money could buy. He was pleased to propose this toast, as he felt that he could fairly claim, without being accused of egotism, that he knew something of the Glover-West system of vertical retort carbonization, because it was his privilege to have control, at one of the Manchester stations, of the working of the first plant installed outside the works of one of the co-inventors of the system (Mr. Samuel Glover) at St. Helens. When he first saw the plant at work at St. Helens, he realized the possibilities of the system; and these possibilities had been thoroughly borne out by practical experience of the working of the installation. They had had three years' experience of its working; and he assured them that the more they worked it, the more they liked it. Another installation was now being put down at the Rochdale Road works; and he hoped it would be ready soon after Christmas. It might interest some of them to know what they had achieved at Manchester on the small installation. The figures for the twelve months ending March last showed a production of 13,115 cubic feet of gas per ton of coal carbonized (corrected to standard temperature and pressure) of an illuminating power of 15¾ candles and a calorific value of 560 B.Th.U. (continuous analysis of the gas produced showing only a content of from 5 to 6 per cent. of the inert gases, oxygen, nitrogen, and carbonic acid), the sale of 9¾ cwt. of absolutely dry coke, and 46 gallons of liquid products in the shape of tar and ammoniacal liquor. These figures, he thought, were excellent, and were such as could not have been obtained with the intermittent system at their other works with the same coal. Then, again, the plant had not had a lengthy run on one quality of coal, because it had been used for experimental purposes to a large extent. Consequently, conditions of working had had to be changed from day to day—a practice which did not allow a plant to show its full capabilities. The more experience he had of the continuous system of carbonizing in vertical retorts the more convinced he became that it was far in advance, in every way, of every other system of carbonizing. In a residential and visitors' district like Southport, it would be suicidal to adopt any intermittent system when extending their carbonizing plant. There were many excellent systems in vogue in these days; but he did not very well see how Southport could have chosen any other system. As a residential place, Southport had to set an example to visitors with regard to the smoke nuisance. He could say a great deal more about the system; but he did not wish to weary them by doing so. He desired, however, to say a word or two as to the leading spirit in the conception of this particular system of continuous carbonizing, and the other leading spirit (Mr. John Bond) who would have to work it. In gas-engineering circles, Mr. Bond had an excellent reputation—the reputation of being a hard worker and a highly scientific man. He need say no more than this; but if the Southport authorities were wise, they would hold fast to him. With regard to Mr. John West, he ventured to say that during the last thirty or forty years no single engineer had done more—he questioned whether anyone had done as much—for the gas industry than Mr. West. [Applause.] Thirty years ago Mr. West introduced his stoking machinery, in spite of all the difficulties and obstructions which were put in his way—difficulties which would have daunted and crushed most men. Mr. West, however, brought his machinery to a high state of perfection, which enabled gas to be produced by its aid at a low cost, and, at the same time, ameliorated considerably the conditions of labour in retort-houses. Now Mr. West was again to the front with a system of carbonizing which he (Mr. Newbigging) ventured to say would eventually become the universal system of distilling coal for the production of town gas. There was not a single failure of any installation to record. Mr. West, as he had already said, had perhaps done more to promote the gas industry by his work than any other single engineer; and he (Mr. Newbigging) was firmly convinced that the Birmingham Medal (which is awarded for "orignality in connection with the manufacture and application of gas") ought long since to have been bestowed upon him. [Applause.] He need hardly remind them that his remarks were uttered in the presence of this year's President of the Institution, and that Mr. John West himself had, in fact, occupied this very honourable position, He sincerely hoped the suggestion he put forward would be taken up, and that amends would soon be made to one who had done so much for the profession. Referring to Mr. Bond, Mr. Newbigging spoke of the high estimation in which he was held by his colleagues, as shown by the fact that he was marked for the occupancy of the presidential chair of the Institution of Gas Engineers after June next. He would be surprised if Mr. Bond, with his highly-trained scientific mind, did not eventually throw some new light on the fascinating principle of carbonizing in vertical retorts. He was sure the new works would prove of the utmost benefit to the gas consumers of Southport.

Mr. BOND, responding, said it was particularly fortunate that Mr. Newbigging should have proposed the toast, as he had such a lengthy experience of the working of Glover-West vertical retorts. When Southport were considering the question of the adoption of verticals, the Gas Committee sent a deputation to various towns. The deputation consisted of the Chairman (Mr. Alderman Trounson), the then Deputy-Chairman (Councillor Richardson), and himself. One of the places visited was Manchester, where they were able to gain a large amount of valuable information from Mr. Newbigging, not only with regard to vertical retorts, but also with respect to telpher plants. In due course, the Council decided to instal the Glover-West system, with telpher plant, at a cost of something like £20,000; the whole of the money to be paid out of revenue. Previously to this, the Committee had spent something like £32,000 on reconstruction work, and every penny of it had been paid out of revenue. Not one penny had been taken from the capital account for works during the last ten years. After paying a compliment to Messrs. West's representatives for the thorough way in which they had handled the contract, and to the work of his own men under the guidance of his Chief Assistant, Mr. Walmsley, Mr. Bond went on to enumerate some of the principal advantages of the Glover-West system—increased make of gas per ton of coal carbonized, increased value of fluid residuals, a larger quantity and better quality of gas, together with coke of improved value. There were other excellent points in the new system; but two special features which appealed to him were that there would not be so much smoke to pollute the atmosphere, and cheaper gas would be obtained.

Alderman GRIFFITHS, who proposed the "Profession of Gas Engineers," remarked that, on behalf of the Corporation of Southport, he desired to say how extremely glad they were to see so large a number of the members of the Institution of Gas Engineers present. He was particularly glad they were favoured by the presence of Mr. Edward Allen, the President. Not only were they favoured by the presence of the President, but they had the gratification of knowing that the successor to Mr. Allen was to be their friend Mr. John Bond. He sincerely hoped they would have the pleasure of welcoming them again to the town.

Mr. EDWARD ALLEN, replying, said he wished to congratulate the Gas Committee and Mr. Bond on having such excellent plant in Southport for the manufacture of gas. That they chose wisely went without saying. In Liverpool, after considering carefully the different systems of carbonization, they ordered the Glover-West plant, because they found improvements in it which had not been carried out in others. They also found that the producing power of the continuous system was much in excess of any other. He alluded to Mr. Bond's special capabilities in important research work in connection with the efficiency of gas-fires, and said he was sure the Institution would be greatly honoured by his presence next year in the chair. Alluding to the eminent services rendered to the profession by Mr. John West, and to Mr. Newbigging's suggestion in regard to the Birmingham Medal, he agreed that Mr. West had shown such conspicuous ability, and had achieved such wonderful success, that he was worthy of the highest honours his colleagues could bestow upon him.

Councillor RICHARDSON proposed the health of "The Contractors," and said they had done their work excellently. The gas industry in this country, and in almost every other country, owed a great debt of gratitude to men like Mr. West.

Mr. JOHN WEST thanked Councillor Richardson for the kind words he had spoken. He said he was sure the installation would give a good account of itself, and be a credit, not only to Southport, but to the makers of it. All the Gas Committee Chairmen he had known at Southport had taken a great interest in the question of vertical retorts. As a matter of fact, Southport was intimately connected with the working out of the Glover-West system. Experiments were made in secret at St. Helens; and after he had satisfied himself that there was some good in the scheme, the next thing wanted was independent testimony. Up to that point he had spent about £5000 on experiments alone. He then asked the late Alderman Travis if he would lend him his Chemist, Mr. Blundell, who saw the apparatus, and did a lot of work in connection with it. After this it was decided to seek the advice of Dr. Harold G. Colman, who was regarded as one of the highest authorities on the subject of coal testing; and eventually coal was sent from Australia, from Canada, from New York, and from other places to be worked by the new process. Experiments went on for months, and ultimately success was achieved. The continuous carbonizing system had been a great saving to a large number of corporations and companies. At Helensburgh, after working the system twelve months, they reduced the price of gas 5d. per 1000 cubic feet, and in another twelve months they lowered it again by a similar amount. And they had now increased the salary of their Engineer. [Laughter.] As Mr. Kay advocated in his brilliant speech—"every tub should stand on its own bottom." Lower the price to the consumer, and supply gas as cheaply as possible, and they would find the consumption increasing by leaps and bounds. The old system of hand-charging required men of muscle and bone to work it; and it would carbonize 2 tons of coal per day, at a cost of 5s., or a little more. This meant that for 100 tons fifty men would be required. When machinery was introduced, it brought down the figure by more than one-half. These fifty men would produce gas at the rate of 20,000 cubic feet per man per day; but under the present system, six men would carbonize 100 tons, and an easy job it would be. This meant that each man would carbonize about 17 tons, and make about 200,000 cubic feet of gas per day, or ten times more than was possible under the old system of hand charging. It meant, also, that it brought down stoking costs to about 4d. per ton. At Rochdale Road, where the Glover-West system was installed, the question was raised as to whether the ordinary labourer could learn to control this new scientific apparatus. It was there proved that the men of muscle and bone were also able to work on skilled lines. What they wanted in the working of the vertical-retort system was not so much muscle as brains. There was plenty of intelligence among workmen, if properly directed. In conclusion, he remarked that he was glad to see around him that day a number of friends of more than forty years' standing.

Alderman HAYES, the Deputy-Chairman of the Southport Gas Committee, proposed the health of "The Visitors."

Mr. W. W. WOODWARD (Salford) acknowledged the compliment, and thanked the Committee for their generous hospitality.

Mr. A. MORTON FYFFE (Nelson) also replied. He assured them that they need have no fear of the Glover-West installation proving unsatisfactory. A short time ago they erected one at Nelson; and only last week an order was placed for another plant on the same principle. His Committee were, indeed, very pleased with the working of their new installation.

Councillor T. E. WILLETT, J.P., gave "The Press" in a felicitous and happy speech—special allusion being made to the Technical Press; and the toast of "The Chairman" concluded the proceedings.

The Rochdale Town Council have increased the salary of Mr. Frank Hoyle Brunt, Assoc.M.Inst.C.E., the Water Engineer and Manager, by £50 per annum.

Mr. George Anderson, whose death on the 12th of August last, at the age of ninety-one, was noticed in the "JOURNAL" at the time, left personalty of the net value of £85,085. Among his bequests is one of £500, payable by five equal annual instalments, to the National Anti-Vivisection Society; and other bequests to hospitals are subject to the condition that vivisection is neither practised nor sanctioned by them.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Quarterly Meeting at Barnsley.

THE One-Hundred-and-Sixty-Eighth Quarterly Meeting of the Manchester District Institution of Gas Engineers was held on Saturday, at Barnsley. Between seventy and eighty members were present.

Upon arrival at Barnsley, the visitors repaired to the Queen's Hotel, where Mr. F. Middleton, the Secretary of the Old Silkstone Collieries, Limited, extended a hearty welcome to the President (Mr. John C. Belton, of Chester) and his colleagues, After partaking of refreshments, the members were conveyed in motors to the Barugh works of the Company, for the purpose of inspecting the coal washing and screening plant, the coke-ovens and bye-products recovery plant, and the tar distillation and benzol recovery plant.

COKE AND CHEMICAL WORKS OF THE OLD SILKSTONE COLLIERIES, LIMITED.

Quite an army of courteous officials escorted the members through the works; the scheduled 2½ hours allowed for inspection proving all too insufficient for the majority of the visitors, who were delighted with what they heard and saw. The inspecting parties were piloted through the various shops by Mr. Marshall Nicholson, J.P. (a Director of the Old Silkstone Collieries), Mr. R. G. Brown (a Director), Mr. L. C. Parkin (General Manager), Mr. F. Middleton, Mr. G. Thorpe (Manager), Mr. N. Schuster (Engineer of the Coke-Ovens and Bye-Products Company), Mr. Wm. Frazer (Manager of the coke-oven plant), Mr. J. Brookes (Assistant-Manager), Mr. H. Townend (Mining Manager of the Collieries), Mr. Fred Ellison and Mr. Henry Ellison (of the benzol and tar department), Mr. G. Houghton (Mechanical Engineer of the coke-oven plant), Mr. J. J. Back, of Paris, aud many other gentlemen connected with the coke-oven and bye-products recovery plant department. A visit was also paid to the electric-power station of the Yorkshire Waste Heat Company, which, it was explained by Mr. W. B. Woodhouse (the Chief Engineer), has been designed to utilize all the surplus gas from the coke-oven plant continuously day and night for the production of electricity.

The Association was most fortunate in having the opportunity of inspecting these works, which were aptly described by one of the members as the last word in coking practice and bye-product recovery. They were laid out by the Coke-Ovens and Bye-Products Company, Limited, to the design of their Engineer, Mr. N. Schuster, Assoc.M.Inst.M.E. The site is conveniently chosen to receive by rail the coal slack from all three pits of the Colliery Company. The installation is designed to deal with 3750 tons of coal per week, yielding about 2750 tons of coke. The gas production is estimated at 10,000 cubic feet per ton, and has a net calorific value of 549 B.Th.U. per cubic foot. An analysis of gas from the unwashed slack shows the following percentages: Nitrogen 6·6, hydrogen 49·1, methane 32·6, heavy hydrocarbons 3·6, and carbon monoxide 8·1. After treatment for bye-product recovery, some 50 per cent. of the gas is used for heating the ovens, some for heating the boilers on the works, and the Yorkshire Electric Power Company, whose works are situated near by, take as much as they can use. They depend, in the ordinary course, entirely on the gas for the generation of their current. At present they cannot take quite all the gas, and the surplus is allowed to burn away. They pay the Colliery Company about ·08d. per unit of electricity generated with their gas, which works out roughly at about 2d. per 1000 cubic feet.

THE WASHERY.

Raw coal below 2½ inches is delivered to the works from all the pits by rail, and automatically tipped in front of the washery. This is a large building in ferro-concrete work, and an excellent example of this system applied to large structures. By an elaborate scheme of screening and washing, which need not here be described in detail, the coal is divided in various sizes, freed from dust and dirt, and drained by an ingenious piece of mechanism, and the nuts above ½ inch dispatched by rail. The fine coal for coking is delivered into the compressing box of a combined coal-charging and coke-pushing machine, where it is compressed by two electrically-driven hammers into a solid cake, ready to be charged into the ovens. The water required for the washing process is used over and over again; only losses through evaporation requiring to be made good.

THE COKE OVENS.

The coke-ovens are of the regenerator type, built under licence of the Koppers patents. There are 80 ovens, arranged in two batteries of 40 each. Centrally between the two batteries is situated the coking-coal tower, with a storage capacity of some 600 tons. The ovens are of the vertical flue type, there being 30 vertical flues to each heating wall separating any two adjacent carbonizing chambers. A gas jet and air inlet are provided at the bottom, and an opening for inspection and regulation at the top of each individual heating flue. This arrangement enables the complete control of the combustion, and the uniform heating of the walls of the carbonizing chambers, ensuring the manufacture of a high-class furnace coke, and a maximum of surplus gas available after providing for the heating of the ovens. The regenerators are arranged parallel to the axis of the carbonizing chambers. Two spacious and well-aired passages are arranged below the bottom level of the carbonizing chambers at both sides of the regenerator settings, and extending over the whole length of each of the two batteries. Here are placed the heating gas distributing mains and cast-iron air and waste-heat reversing valves. An electrically-driven reversing gear, placed in a small annexe at the outer end of each of the two batteries of ovens, suitably connected with the gas-distributing and air valves, automatically reverses the flow of heating gas and combustion air every half-hour. For this purpose the vertical heating flues of each heating wall and the regenerators are divided into two halves, one half being supplied with heating gas and combustion air, while the other half serves to evacuate the products of combustion, and *vice versâ*. The air, prior to its being admitted at the bottom of the heating flues, has been pre-heated by passing through the corresponding halves of the regenerators, and brought up to an average temperature of about 1800° Fahr., while the products of combustion leave the other halves of the regenerators at a mean temperature below 400° Fahr., to be evacuated through chimneys.

The coke is discharged by means of coke pushers on to the inclined benches; the quenching of the incandescent coke being effected by passing it through a coke quencher, consisting of a steel casing provided with water pipes, where it is subjected to an intense spray from numerous water jets. The quenched coke is then charged by hand into railway trucks running by gravitation along a track in front of the benches. A noteworthy innovation in connection with this installation is the provision of a handsome steel roof extending over the whole length of each of the two batteries of ovens, effectively protecting the oven brickwork from rain, snow, &c., increasing the life of the ovens, reducing heat losses, and incidentally offering protection against inclement weather to the men engaged working the ovens. The charges are worked off in from 36 to 42 hours.

BYE-PRODUCT RECOVERY PLANT.

The bye-product recovery plant is designed on the same lines as generally found in gas-works, in preference to direct and semi-direct processes. There are six water-tube condensers. There are two sets of exhausters of the Beale type, each able to deal with the whole make of gas. Next come two tar-extractors of the Pelouze and Audouin type. Then there are two standard ammonia scrubbers to remove any remaining ammonia from the gas. All liquor and tar are collected in a tank and basin, and are pumped from here to a settling tank, where they separate by gravitation, and flow into storage tanks. The ammoniacal liquor is worked up into sulphate. There are two steam-heated stills and one auxillary lime-still fitted to each, and two Wilton saturators. The salt produced evoked general admiration from the visitors for its colour and quality. The estimated production is 27 to 30 lbs. per ton of coal. After passing the ammonia washers, the gas is taken at a temperature of 20° to 25° C. to the two benzol tower scrubbers, which are worked in series. Each scrubber consists of a cylindrical steel shell, 60 feet in height and 10 feet in diameter, fitted with wooden grids. The absorbent used is a specially prepared creosote oil. The enriched washing oil, when it has done its work, overflows continuously to the benzol distilling plant. The bye-product recovery installation, except the benzol scrubbing plant, was erected by the Compagnie pour la Fabrication des Compteurs et de Matériel d'Usines à Gaz, of Paris, who are represented in England by the Coke-Ovens and Bye-Products Company, Limited.

TAR AND BENZOL DISTILLING PLANT.

The yield of tar (sp. gr. 1·16) amounts to about 111 lbs. per ton of coal (dry) carbonized. The crude tar, which contains about 3 per cent. of water, is first delivered into dehydrators, of which there are two, each one working in conjunction with a tar still of about 20 tons capacity. Each dehydrator has a capacity of about 20 tons, and consists of a cylindrical vessel provided with coils through which the hot vapours from the stills are passed on their way to the final condensers. The tar circulating round the coil is pre-heated, and the greater part of the water driven off in the form of steam, which is subsequently led to a water-cooled condenser, where it is reduced again to the liquid state. From the dehydrator the pre-heated tar is run off into the tar stills, where it is distilled by means of direct fire, assisted by forced draught, and injection of steam during the last stage of the process. Both stills are of the usual type, consisting of a riveted cylindrical steel shell provided with a dome-shaped top and concave bottom, set in brickwork; the furnace being arranged beneath the still in the lower part of the setting. The gaseous products of distillation from the stills, after having passed through the dehydrators, are led to the final water-cooled condensers. The condensed products—ammoniacal liquor, crude naphtha, carbolic oils, creosote

oils, and anthracene oils—flow into the receivers adjacent to the water-cooled condensers, whence they are run off into their respective storage tanks. The receivers are fitted with a steam ejector, which removes the foul gases and carries them into the furnaces under the stills where they are burnt. The residuary hot pitch, after the oils are distilled off as far as practicable, is run off the still periodically into a pitch cooler, consisting of a suitable wrought-iron tank. From here the pitch, after having sufficiently cooled down to prevent ignition when brought in contact with the atmosphere, is run into the open pitch bed to solidify.

The benzol distilling plant is in close proximity to the tar plant. The benzolized creosote oil, containing about 2 to 3 per cent. of benzol, is passed through an oil heater, and subsequently through one or both of the pre-heaters, located above the debenzolizer or crude oil still (so called after the product "crude oil" obtained from it). Here the oil is heated by means of steam coils to a temperature ranging between 105° and 110° C., and then enters the still and traverses a series of segments containing serrated trays. Wet steam is fed in at the base of the still, which on meeting the pre-heated oil carries off the benzol. The top portion of the still fractionates the benzol from the heavy portion of the creosote, likewise carried away by the "wet" steam. The benzol vapours next pass through the oil heater, which serves partially to pre-heat the oil and cool the vapours. From here the latter go to a water-cooled condenser, the condensates passing from the coils to the lower part, where the crude benzol separates from the water; the former being run to a storage tank, and the latter withdrawn by a self-acting syphon. The crude still is regulated to give a product which, when distilled in a retort, yields 65 per cent. of distillate at 120° C. The debenzolized oil is pumped back to the scrubbers for the absorption of more benzol. Should it be necessary at any time to stop the crude still for the purpose of repairs or on account of insufficient steam or water, the oil can be bye-passed, and this convenience enables it to be circulated through the scrubbers until it is saturated.

For the first rectification, the crude 65 per cent. benzol is pumped into an intermittent still, heated by a steam coil, and assisted by "wet" steam for the higher boiling products. The vapours from the still pass through a fractionating column to a water-cooled "analyzer," and the vapours passing forward are condensed by a water-cooled condenser; the products—90 per cent. unwashed benzol, toluol, and naphthas—being run into their respective storage tanks. The residues from the intermittent stills are run off into a receiving tank, and delivered from here by means of compressed air to the tar plant, where they are dealt with. After the first distillation, the benzol and naphthas are taken from the storage tanks to undergo the process of chemical washing. For this purpose the crude 90 per cent. products are pumped into a cast-iron washer, provided with an agitator. Concentrated sulphuric acid (168° Tw.) is here added, and the mixture agitated for several hours. The acid is then allowed to settle, and is subsequently run off, while the remaining light oils are treated with a solution of caustic soda. The acid removes the basic impurities, and the caustic soda neutralizes any acidity, and also extracts the small amount of phenols present. The waste acid from the washer is run into iron pots fitted with fluted lids and outlet pipes, situated outside the benzol house, and is here heated with steam, which causes the lighter portion of the impurities to evaporate, leaving behind the acid and a spongy soft coke; the former is run off by a bottom cock to a tank below, while the coke is dug out and sent to the tip.

For the final rectification, the washed 90 per cent. products are redistilled in a still similar to that used for the first rectification, and the finished products obtained are run into their respective storage tanks. Here every facility is provided for the prompt dispatch of the benzol, toluol, and naphthas in railway tanks or barrels. It is estimated that 3 gallons of crude benzol are produced per ton of coal.

The whole of the tar and benzol plant was erected by Messrs. Henry Ellison, Limited, of Cleckheaton, Yorks.

THE BUSINESS MEETING.

The business meeting was held in the Miners' Conference Hall—Mr. J. C. Belton presiding.

The President said that, before the formal proceedings commenced, Mr. Nicholson desired to address the members.

Mr. Nicholson, who was cordially received, said that, on behalf of the Old Silkstone Collieries, he begged to offer the members a hearty reception that afternoon. He assured them that his co-Directors were honoured to receive a visit from the Institution, and to think they had been so interested as to inspect the coke-oven plant at Barugh. As a body of scientific men, they must, of course, appreciate the various efforts in operation at Barugh for the production of gas and making the most of it. He regretted the absence of the Chairman of the Company; but, on behalf of the Board, he and his colleague, Mr. Brown, were glad to welcome them, and hoped their visit had proved interesting.

The President, in reply, assured Mr. Nicholson that the members thanked them sincerely for the hearty reception extended to them that day, as well as for their kindness in inviting them to inspect the magnificent plant they had seen. They all felt, he was sure, very grateful to the gentlemen who escorted them through the Barugh works; and they would carry away with them an instructive idea of what the Old Silkstone authorities were doing, both in the production of gas and in making the most of it. They were undoubtedly "making the most of it."

The Hon. Secretary (Mr. W. Whatmough, of Heywood) having read the minutes of the previous meeting, they were adopted.

Letters of apology for non-attendance were announced from, among others, Mr. Thomas Newbigging, D.Sc., M.Inst.C.E., Hon. Treasurer of the Institution, and Mr. Edward Allen, the President of the Institution of Gas Engineers.

The Late Mr. Armitage Drake.

The President said that, since the last meeting, there had passed away from the gas industry one who made his mark on the engineering side—a man who was highly respected and honoured by all who knew him as an upright, straightforward man of business and a good friend to those who had the privilege of his acquaintance. He referred to the late Mr. Armitage Drake. He thought it would be fitting if the members rose in silence in token of their sympathy with his widow.

The proposal was silently agreed to.

Election of New Members.

The following new members were elected: Mr. William M. Ruxton, of Carnarvon; Mr. Owen Evans, of Wrexham; Mr. Frank Batt, of Flint; Mr. Robert H. Brown, of Birkenhead; Mr. Richard T. Surtees, of Newton-le-Willows; Mr. Fred Schofield, of Drighlington, near Leeds; and Mr. Frederick V. Barnes, of Todmorden.

Election of Officers.

The President announced that Mr. J. H. Hill (York) and Mr. J. Wilkinson (Tyldesley) had been appointed Scrutineers to report on the election of officers.

The following elections were made unanimously:

Senior Vice-President.—Mr. E. A. Harman, of Huddersfield.
Junior Vice-President.—Mr. W. Whatmough, of Heywood.
Hon. Treasurer.—Mr. Thomas Newbigging, D.Sc., of Manchester.
Hon. Secretary.—Mr. G. S. Frith, of Runcorn.
Committee.—Mr. E. H. Hudson, of Normanton; Mr. W. Baillie, of Keighley; Mr. J. H. Woodward, of Skipton.
Auditors.—Mr. Charles Potts, of Hyde; Mr. William Hill, of Stalybridge.

The President, in announcing the election of Mr. Frith, said he was certain they would find him a very able and energetic Secretary in succession to their friend Mr. Whatmough, who had done such admirable work for the Institution for the last six years.

Thanks to the Silkstone Company.

The President said the duty he now had was a very pleasant one. It did not need a long speech from him to commend it to their acceptance. He proposed that their heartiest thanks be given to the Directors of the Old Silkstone Colliery for the treat they had given them that day in permitting them to look over their fine works. He was sure they had all enjoyed it. The only thing that was wanting was greater time to look into the several processes more thoroughly than they had been able to do. He could congratulate the Company on the way in which they were dealing with their coal; and he was sure those undertakings they were supplying would have seen that day that the Old Silkstone Colliery were doing the best they possibly could to turn out their product in a manner fit for gas-making purposes. Passing in lighter vein to another phase of the subject of coal, the President observed that, as gas engineers, the only thing they had to complain about was that the prices kept too high. He did not know anything about the financial results of the Old Silkstone Colliery; but he thought they ought, like gas undertakings, to be limited in their dividends. He believed, however, that the returns from their undertaking had not, hitherto, been very great; but he supposed the Silkstone people—in common with gas people—would "bear rather a good name than riches." [Laughter.] At any rate, he was sure the members would agree that they had had a great treat. The extensive works erected at Barugh were evidently intended to serve for a very long period; for he understood there were about 120 million tons of coal available round the district. He had also heard that the Old Silkstone authorities were turning their attention to the question of smokeless fuel. This was a business which colliery undertakings could go into better than gas-works; and he thought they would make a success of it. He moved that their best thanks be accorded to the Directors for showing them their works and for their hospitality. [Applause.]

Mr. H. Kendrick (Stretford) seconded the motion, which was carried by acclamation.

Mr. Nicholson said that, on behalf of his co-Directors, he desired to say they were grateful for the resolution. He hoped they would always be on good terms with the gas engineers of the country. It had been mentioned by one member that he thought the price of coal was too high; but he supposed the speaker meant this in a relative sort of manner, because, after all, the selling price of coal was governed by the cost of production. If, in production, they had to pay more wages, then people must expect to pay a little more for coal. For instance, if the Government, or Mr. Lloyd George, put any more taxes on, they must be prepared to pay their share. They could not expect the coalowners to pay the whole amount. He assured them that the Company were pleased to welcome them to Barnsley, and hoped what they had seen would provide food for reflection. On the other hand, they

were always glad to receive from gas engineers hints that might be beneficial in regard to their own trade.

The Juniors' University Lectures.

The President asked the meeting to deal with a matter of urgency which did not appear on the *agenda*. It was a communication from the Manchester and District Junior Gas Association asking the Institution to consider favourably their application for a grant in aid of the lectures at the Manchester University. He did not think it needed any words of his to recommend the continuance of the grant. They, as the Senior Institution, knew full well the value of these lectures; and they were appreciated by the members of the Junior Association. They had already accomplished a great deal of good, and more good might yet be done. A capital syllabus had been prepared for the winter session; and the expenses of the Juniors had, therefore, slightly increased. He thought that at any rate they ought not to vote less than the amount they contributed last year (£15).

Mr. J. W. Morrison (Sheffield) said he certainly thought the grant should be made, if the finances of the Institution would stand it. The lectures did a great deal of good.

The necessary assurance having been given on this point,

Mr. J. H. Brearley (Longwood) seconded the motion, which was agreed to unanimously.

Caring for the Consumer.

Mr. F. D. Richmond, of Heckmondwike, then read a paper entitled "Caring for the Consumer." This, with a report of the discussion upon it, will be found below.

The President-Elect.

The President said it gave him much pleasure to announce that the voting for President-Elect had resulted in the unanimous selection of Mr. J. G. Newbigging, M.Inst.C.E. He cordially congratulated him, and expressed the hope that he would have a happy year of office.

Mr. Newbigging said he was conscious of the honour they had done him by electing him as President for the next session. He was recently surprised, when looking over the register, to find he was one of the oldest members. During his year of office he would take care that the honourable position of President of the Institution lost nothing of its dignity through him. The duties would be carried out with the honours customary to that dignity. He had to convey to them, on behalf of his Chairman, Councillor Kay, who, as they evidently knew, was doing a great deal for the gas industry, an invitation to the members of the Institution to meet him in May next, along with members of the Gas Committee, and take luncheon at the Manchester Town Hall. The members would also be afforded the opportunity of inspecting the gas-works, and he hoped to have something of interest to show them all.

On behalf of the members, the President said he accepted the invitation with pleasure.

The Dinner.

By kind invitation of the Directors of the Old Silkstone Colliery Company, Limited, the members of the Institution were entertained in the evening at dinner at the Arcadian Restaurant—Mr. Marshall Nicholson presiding. Covers were laid for 120 guests.

After the loyal toast had been duly honoured,

Mr. Whatmough said he had the greatest possible pleasure in proposing the toast of "The Old Silkstone Colliery Company, Limited." When Mr. Nicholson gave them a cordial welcome in the Miners' Hall that afternoon, he said he hoped they appreciated the efforts made for dealing with coal, He believed they did. When they saw the splendid works at Barugh and the economical treatment of the coal, it made them hold out some hope for a reduction in the price of coal, which was the very thing they were waiting for. He thought they had every reason to expect that, when the next coal contracts were opened, they would be found to show a material reduction. They had, however, seen the splendid works at Barugh and when, in the quietness of their homes, they mastered and assimilated the contents of the *brochure* which had been handed to them, they would have some idea of the magnitude of the Company's operations. He asked them to drink cordially to the health of the Company, coupled with the name of Mr. Middleton, the Company's Secretary.

The toast was cordially pledged, after which,

Mr. Middleton, replying, said he was sorry that Mr. Nicholson had had to leave, because he had not been able to hear the very kind remarks they had made about him. He appreciated all that Mr. Whatmough had said anent their visit to the works. They had, however, had a great deal to assist them in the laying out of their plant at Barugh, They had had the benefit of the experience of other colliery proprietors who had had plants in operation for some years past. Among colliery proprietors, he might say, the same feeling of *bonne camaraderie* prevailed as among gas engineers. Colliery proprietors, like gas engineers, therefore, assisted oue another as much as possible with information as to plant and methods of working. They also had the benefit of laying out their plant on what he might term virgin ground, and therefore they had been able to lay it out on symmetrical lines to great effect. He assured them that the Company were particularly pleased to have the opportunity of extending a little hospitality to the members of the Institution that evening. When the suggestion was made to them that the members would like to visit Barnsley, they were exceedingly pleased, especially as they thought the members would be interested to see the new plant at Barugh. One of the principal reasons why that plant was put down was the low price of gas coal which had obtained for so many years past. [Laughter]. "There were other reasons, too," he proceeded, after this rejoinder to Mr. Whatmough; and some of the reasons were very important ones. They all knew what the trend of legislation had been during the last few years. They had had thrust upon them certain Acts—the Workmen's Compensation Act, a new Mines Act, Health Insurance, &c. It might be of some interest to them to know that the Workmen's Compensation Act cost the Colliery Company something like £5000 per annum to cover themselves against that risk alone. The Health Insurance Act cost them something like £2000 per annum. In addition to this, they all knew the state of affairs in the labour market to-day. Twenty years ago the production per man was something like two tons. To-day, as a result of increased wages, the production per man was only about 18 cwt. They could draw their own conclusions from that. There was one problem which affected all who were present that night. Here were they putting down a large plant of coking-ovens. On the other hand were the gas undertakings which, were feeling the pinch of the market as regards the price of coke. Coke to-day could not be produced profitably; and, so far as they were concerned, the loss on coking transactions was minimizing the profits they were obtaining from residuals. In face of this they had to consider that there were now between eight and nine hundred bye-product companies installing plant in this country. What, then, was going to become of all the coke? The word bye-product, he said, was somewhat synonymous with the term side-issue; so that, so far as coke was concerned, it was a side-issue. But bye-product meant revenue. There was another point, and they were looking for relief. The present state of the iron trade did not show much hope for improvement in the near future. It was possible, if we got some alteration in our existing tariff arrangement, and prevented the landing of foreign steel and iron in this country, that things would improve. There was, however, another outlook, and that was the question of smokeless fuel. They had followed with close interest the papers read before the British Association, and the various interesting articles which appeared in the Technical Press. As regarded smokeless fuel, however, they were now thoroughly investigating the matter. They believed there was a certain future for low-temperature carbonization, and they were paying very close attention to the matter. He would like to close with just a personal note. The Old Silkstone Collieries had been dealing with gas engineers for many years now, and had had much experience of them. Might he say that wherever they, or any of their representatives, had gone, they had always had unfailing courtesy and consideration. He assured them the Directors of Old Silkstone and the management had a keen appreciation of this.

Mr. John Carter (Lincoln) also spoke, and said the whole of the Eastern Counties voiced the sentiments enunciated by Mr. Whatmough. Speaking of the pleasure it gave him to attend the gathering that day, he alluded to the excelleut work of the Manchester Institution of Gas Engineers. This good work, he reminded them, had gone on for more than forty years, and it was therefore no wonder other Associations followed its movements so closely. They in the Eastern Counties regarded Manchester as the great educational force and pioneer in district work, and in one respect particularly. Where would have been the position of the British Commercial Gas Association to-day but for the pioneer efforts of the Manchester Institution? He would carry back with him to the Eastern Counties the happiest recollections of his visit that day. In conclusion, he wished the Manchester Institution a long life of usefulness, and said he hoped the members would long continue to widen and broaden the views of their colleagues up and down the country. Only by such enthusiasm as theirs was it possible to help forward the work of the profession to which they were all so proud to belong.

Mr. Middleton afterwards gave the toast of the Manchester and District Institution, which was heartily received, and the President (Mr. J. C. Belton) briefly responded.

CARING FOR THE CONSUMER.

By F. D. Richmond, of Heckmondwike.

[A Paper read before the Manchester District Institution of Gas Engineers, Nov. 1.]

When I promised the President, in May last, that I would read a paper for this meeting, I had in my mind quite a different title, and on a subject more applicable to our meeting to-day—namely, "A Ton of Coal." Much to my regret, however, I have not been able to complete all my investigations in the matter.

Important as is the question of the £ *s. d.* out of a ton of coal, the caring for the consumer is equally so. This was brought home to me very forcibly when I took up my present position about nine years ago. I was then faced with the problem of how to increase the revenue of the undertaking, with no growth taking place in the district, in order to provide the wherewithal to renew and reconstruct practically the whole of the manufacturing plant, and to bring down a very heavy leakage to a normal percentage by the renewing of a large number of mains and services.

Making the Best of a District.

After I had made myself familiar with the district and the class of consumer we were supplying, I came to the conclusion that what I had experienced in the position in London which I vacated to come to Heckmondwike, with regard to the field for increasing the sales of gas, would be somewhat different from the class of consumer I had to deal with. I felt certain that the field for the use of gas for cooking and heating (particularly the latter) would be somewhat limited; and after nine years' experience I find what I then surmised has been the case, despite the easy facilities we are giving for supplying the necessary apparatus. There are several causes why, in a district such as I have to deal with, the use of gas for cooking and heating is not very extensive. In the first place, coal is close at hand; but what has been the greatest drawback is the fact that a very large number of the houses tenanted by the

working class—representing some 80 per cent. of our total number of consumers—are of such a type that there is no room for a gas-cooker.

We have hundreds of consumers who would be only too glad to have a cooker, but they are unable to find a place in which it could be fixed. The same reason, the type of house, also applies with regard to heating by gas. It is not a question of the price of gas; this being 2s. 6d. per 1000 cubic feet, and below the average of several of the surrounding districts. The fixing of free boiling rings and grillers has, of course, been adopted in houses where it is impossible to find room for a cooker; but in a district where home bread-making is universal, they are a poor substitute from the point of view of gas consumption. As already stated, the growth of the district was practically *nil;* and it has remained at a stand-still ever since. The question to me was how to increase the gas consumption among present consumers and get every house in the district to use gas. To this end, I adopted several schemes of "caring for the consumer" which I hope will be of interest to you and provoke a good discussion.

Popularizing Cookers.

With regard to the use of gas for cooking, the hiring-out of cookers at nominal rents, and in the case of slot consumers free of rent, also the free fixing, was commenced. This met with a fair measure of success; but for the reason already stated, we have not been able to get the proportion of cookers to the number of consumers by a long way—this at the present time being about 1 in 9. I have instituted a scheme for looking after the cookers we have fixed, so as to get as much return as possible from the limited number we have been able to place on the district. An inspection book is kept, and periodical visits are made, and a record entered as to whether the cooker is being made proper use of. The inspector does any adjustments or repairs that may be necessary, and explains to the consumer how to make the most use of the cooker. We have also from time to time held exhibitions and demonstrations on "How to Use a Gas-Cooker;" and these have always been very successful.

What I aim at doing is not only to get out as many cookers as possible, but to endeavour to obtain a good return from each one fixed, and to satisfy the consumer that he is receiving full value for the gas used. I consider that it is not only a matter of fixing a cooker, but also of looking after it and seeing that it is made use of. I have taken into consideration the engaging of a lady demonstrator, as is done by many undertakings; but the number of cookers we have in use is not sufficient to warrant it.

The Heating Field—Circulators—Boilers.

With regard to gas for heating, our field in this respect is still more limited. Among the better-class consumers, we have been able to fix gas-fires and stoves; but for the same drawback as with cookers—the type of house—the number of heating appliances installed for domestic use is a very small proportion. We adopt the same method in regard to heating appliances as for cookers—that is, not to be content with having installed a gas fire, radiator, or stove, but to see that the apparatus is kept in working order, and made as much use of as possible by the consumer.

The question of water heating by circulators has received attention ever since the introduction of these very useful appliances; but notwithstanding the easy facilities given for their adoption, there is very little call for them among the class of consumer we supply.

Wash boilers have found favour among a fair number of our consumers; and if there could be placed on the market a combination of wash boiler and bath of a movable type—there are a large number of houses in an industrial area similar to ours without baths—I believe we should find a further field for the use of gas.

We have laid ourselves out in every way to supply apparatus for using gas for cooking and heating, both for domestic and industrial purposes, and supplying the same, either on simple hire or on extended hire-purchase terms—in all cases undertaking the fixing, free of all expense to the consumer, and after the apparatus has been installed giving free service to the maintenance of it.

Gas for power—supplied at a lower rate than for lighting, &c.—is used to a moderate extent, and in any difficulty the consumer experiences we are at all times ready to assist him, though the fault may not rest with the supply of gas but in the engine itself. We often find that an attention on our part to the mechanical workings of a gas-engine, free of charge—especially so in the case of the smaller consumer—goes a long way to satisfy and keep the consumer from adopting some other means for motive power.

Lighting and Maintenance.

The conditions in our area of supply being very much against us for the use of gas for other than lighting purposes, we have endeavoured to popularize as much as possible the advantages of gas for this purpose. We have very strong electrical competition to face; but despite this, we have been very successful, which has to a large extent, I consider, been due to caring for the consumer by giving as much free service as we could afford.

A scheme of maintenance was started about seven years ago, under which we are prepared to send a competent man to clean the consumer's burners and renew mantles, glasses, &c.—charging for the material used at very little more than cost price; no charge being made for the labour. We have a large number of customers, mostly among the shops, public-houses, and better-class consumers, who take advantage of this scheme, which is, of course, a charge upon the undertaking. But the collateral advantages are great, as we can by these means satisfy our consumers by giving them full value for the gas used, and ensuring to them a perfect light. The annual cost to us of this maintenance system is about £70. We look upon this in the light of a standing advertisement, and as such it appeals to the class of consumer we supply.

Among the churches, chapels, and other public buildings we undertake the maintenance and up-keep of the burners at fixed rates per annum, varying according to the class of building and the type of burners and fittings. All the schools in our area are under our care for lighting. There are in all about 500 burners of different types in the schools, and we undertake to make periodical visits for the purpose of cleaning the burners, globes, &c., and renewing them, when required, for a fixed sum which works out at 9½d. per burner per annum. We have found that, taking the cost in the aggregate for this contract maintenance, with proper supervision we have been able to make ends meet, low as is the price. With outside shop lighting we also undertake the supply of lamps and maintenance at fixed rates per annum, but to the ordinary run of consumer the charging of material only as required is more popular.

The Best Advertisement.

In our show-rooms, attached to the offices, which are in a central position, we have a display of all the latest appliances for the use of gas, and everything is done to give consumers an opportunity of seeing what gas can do. We have from time to time carried out different schemes of advertising; but the most effective form of advertisement has been our endeavour to look after the consumer and to satisfy him, as far as we can, that he is getting full value for the gas used. The keeping of the gas supplied at a uniform calorific power day and night has materially helped in this direction.

Selling Mantles to Consumers.

The supplying of mantles, both under the maintenance systems and also as purchased by the consumer at the show-rooms, has received careful attention. We sell a mantle of a good, sound quality, at 3d. and 3½d. There are so many mantles sold by shops and the ordinary run of gas-fitters which are of very inferior quality that I consider it pays an undertaking to supply a good mantle at a low cost, as the consumer in many cases comes to the conclusion that the gas is at fault, whereas it is the mantle; and he is inclined to go in for some other means of illumination owing to the trouble with inferior mantles. This is only a little thing; but then it is the "little things that count" and that help to satisfy the consumer.

Concluding Remarks.

I have endeavoured to give you a general outline of what we do in the way of caring for our consumers. There are in many undertakings perhaps more free services given in the way of maintenance and the supply of gas appliances; but from my experience of other towns with which I have been connected, what one can do in the way of increasing the sales of gas in one place will not meet with the same success in another.

One may carry on a campaign of education of the consumer and meet with good results; but in an area such as we supply, there are many difficulties in the way of creating a larger consumption of gas per consumer which are not met with in other districts. We have therefore tried to make the most of the material at hand by giving every attention and care to such appliances for the use of gas as our consumers have been able to adopt. While we devote a lot of effort to looking after existing appliances in use, we are always on the lookout for other means of increasing the sales of gas. Industrial uses of gas have not been lost sight of; but until we are able to talk of pence per 1000 cubic feet, or on a basis of so much per thousand or million B.Th.U.'s, I am afraid that the growth in this direction will be but slow.

I do not claim that what I have told you we are endeavouring to do to look after our consumers is anything exceptional, but only a statement of the difficulties we have to contend with, in common with many other districts of a like nature, and how I have tried to make the most of what is available. The result has been that we have practically every house supplied with gas for use in some form or other; and though the population of our area of supply is no more than it was nine years ago, there is an increase in the gas sold of 20 million cubic feet per annum, despite the fact of keen electrical and suction-gas competition.

DISCUSSION.

The President (Mr. J. C. Belton) said they were all indebted to Mr. Richmond for his excellent paper, which bristled with matter suggestive for discussion; and he hoped they would have a good debate upon it. Certainly the author was to be congratulated on the gratifying success which had followed the course he had described to them. To his mind, it was a very useful paper, and revealed great resourcefulness in the writer in combating with indomitable energy the difficulties with which he had had to contend.

Mr. G. W. Tooley (Manchester) said that personally he was not concerned very much in the actual process of "caring for the consumer" directly, but he was interested indirectly. He hoped, therefore, they would allow him to make a few remarks upon the subject. He asked the members to contrast the methods which obtained in gas undertakings twenty or thirty years ago, when business was done in the "take-it-or-leave-it" style, with what

prevailed to-day, when the would-be gas consumer was an eagerly-canvassed individual. Was it right? One was forced to the conclusion that the result was one of two things—either that their predecessors were very lax in business habits, or the severe competition of their electrical rivals which obtained to-day had compelled them to adopt methods which were more in accordance with the usages of ordinary commercial life. There was no doubt that gas companies were face to face with a serious situation, and the question of popularizing the commodity which they had for disposal was one of urgent need, with a view to finding some way to safeguard themselves. The point was how were they to hold and encourage the lighting and heating consumer? So far as the latter branch of the business was concerned, there was undoubtedly a wide field for operation; and he ventured to say it was really the only field they had for cultivation. ["No!"] So far as he could see, the lighting business was practically at a standstill. [Further cries of "No!"] He thought there was little scope left so far as lighting operations were concerned; but with judicious handling there was no reason why the heating branch of the business should not produce an abundant harvest. How was this to be brought about? He had never been in sympathy with the policy of singling out a few consumers because they happened to burn gas in a different way from the majority, and giving these people preferential treatment at the expense of the larger number of consumers; neither did he agree that the very large consumer should receive any such favours as he now obtained. [Cries of "Oh!"] This was a democratic age, and they ought to study the interests of that age. The proposal which he hoped to bring forward—and which he submitted with all the diffidence due from an obscure member of the Institution—was that an average should be taken of the summer and winter consumptions for lighting only, and this used as a standard. When that standard was determined, he would then say to the consumer, "Whatever quantity of gas you use beyond a certain amount"—the standard—"we will let you have at a reduced price." [Hear, hear.] This would not only encourage the use of gas for cooking and heating, but obviate having duplicate services and check meters, which at times were so troublesome. It was quite obvious that, at the usual prices charged for gas, gas-fires were not economical; and until something was done, either on the lines he had indicated, or, alternatively, by making a similar arrangement on the basis of the rateable value of the premises, he did not think they would arrive at that desirable period when a smoky atmosphere would be a thing of the past.

Mr. H. KENDRICK (Stretford) said the Company with which he was connected had done something on similar lines to those mentioned by Mr. Richmond in regard to "caring for the consumer." They had a fair amount of success from it, too. For instance, taking 1906 as a basis—that was the year in which they parted with a small portion of their territory to Manchester—their gas sales had increased 20 per cent. Strange to say, the consumption for ordinary meters fell between 1906 and 1909, and then began to increase again. In 1909, their average consumption by ordinary meter was 36,000 cubic feet per annum, and in 1912 it was 38,000 cubic feet. In 1906, the average prepayment meter consumption was 8000 cubic feet; in 1912, it was nearly 13,000 cubic feet. This had been brought about to a large extent by the use of progressive methods, somewhat similar to those outlined by the author of the paper. Stretford did practically everything he had enumerated, with the result that the gas consumption had increased by 61 million cubic feet in six years. On working out the figures the other day, as he had to do for his Directors, he found that 26 millions were due to lighting and 35 millions to heating. He thought this showed what could be done by looking after, and conserving, their consumers. Increased consumption could, to a large extent, be looked forward to by other undertakings if this policy were carried out. The Stretford area was practically all residential, with a high percentage of large houses—people who could afford to hand over the lighting business to their rivals, the electricians. He realized this some time ago; and they put their own "forward" policy in hand in order to combat it successfully. At Stretford, they did one or two things a little differently from Heckmondwike; and he thought it might be an advantage to enumerate some of them. For instance, under the heading of "Popularizing Cookers," Mr. Richmond said "an inspection-book was kept, and periodical visits paid as to whether the cooker was being made proper use of." He thought the author would find it much simpler if he adopted the "card" system, by which the inspector could tell at a glance how matters stood. At Stretford, they had cards for meters, cookers, grillers, burners, geysers—in fact, almost everything. They had a separate set for each, and it acted as an excellent check system. The meter reading cards had a headline, on which there was a record of every apparatus in every house in the district. They found it extremely useful, especially for canvassing purposes and for looking-up consumers generally. Dealing with "Lighting and Maintenance," he noticed that Mr. Richmond's maintenance scheme cost about £70 per annum. In Stretford, they had about 25,000 burners at the present time; and his maintenance cost worked out at something like one-third of a penny per 1000 cubic feet of gas sold. They considered it a good investment, as they could trace a large number of consumers who had been prevented from going over to the electricians by the fact that they were able to get a good light at a reasonable figure. Speaking personally, he could only thank Mr. Richmond for going once again over ground which was so interesting and important to all gas engineers. It only showed how great was the necessity for the frequent consideration of this important subject.

Mr. A. MOTTRAM (Ossett) said he experienced many of the conditions referred to by Mr. Richmond. He noticed, however, that Mr. Richmond's experience was that in many houses he could not instal a cooker because there was no room for it. This was not so in the case of Ossett. Mr. Richmond's position was decidedly unfortunate, for the smaller houses often held large families; and it was in this class of house that the need of the cooker was found in many ways. He suggested that local builders and architects should be approached with regard to the difficulty. It would be a simple matter, he thought, to get them to agree that in all new property room should be provided for both a cooker and a boiler. While speaking of wash-boilers, he should like to ask whether Mr. Richmond fixed them with flues in the kitchen chimneys, or if he took them to the open air? He was glad to learn that the author was in favour of discounts for power purposes, but would like to know what the discount was. In connection with outside shop-window lighting, did Mr. Richmond adopt an inclusive price which covered everything? The author had told them that his show-rooms were the best advertisement he had. He (Mr. Mottram) considered that his best advertisement was a high-pressure lighting instal'ation in the centre of the town. He disagreed with Mr. Tooley when he said there were no prospects of development for lighting. His opinion was that with high-pressure lighting they would not only retain their present customers, but gain a number of new ones. Since he gave a demonstration of high-pressure lighting at Ossett, they had not lost a single consumer to the electricians.

Mr. E. H. HUDSON (Normanton) said they ought to be grateful to Mr. Richmond for his paper on a most interesting subject. Really, he thought the paper, or one on similar lines, ought to come up each year as a "hardy annual." Every year new methods and improvements were introduced, not only with regard to heating and lighting, but in reference to up-to-date methods for increasing gas consumption. It would serve a good purpose if the matter were brought up every year. At Normanton he had adopted somewhat similar methods to Mr. Richmond's for popularizing gas. He supported the author entirely with regard to his free maintenance system. As to popularizing the use of gas-fires, he thought something could be done in this matter if the fires were fixed free of charge. In fact, all gas apparatus ought to be fixed free. The consumer would pay in the end, if they made the charge one against their profits. If these charges, however, became greater in any one year than they cared to see, then let them create a sinking fund; he did not suggest twenty years, but to pay them (say) out of the profits of the next five years. He could not agree with Mr. Tooley's remarks about the treatment of small and large consumers in this democratic age. It would create ill-feeling among customers; and this was the very thing they had to guard against. By creating such a sinking fund as he (the speaker) suggested, they satisfied the person who was going to be of service to them. The cost did not fall on anyone but the consumer. It was not saddled on the undertaking. It was ultimately taken out of the consumer to liquidate the cost of the apparatus in the subsequent two or three years. They must remember that during the whole of this time they were getting increased consumption and making a profit on it. There was another subject which bore largely on Mr. Richmond's ideas for popularizing gas and caring for the consumer. This was getting proper people to do the work. The Manchester Institution were the pioneers in working for the education of gas-fitters. He was glad to say the scheme was now launched; and they would be having instructions from the parent Institution very shortly to go ahead. When they received the order, let everyone make it a point to see that the classes were full. This was the surest way to success. In the end they would benefit not only themselves but the consumer.

Mr. F. H. ROBINSON (Knutsford) remarked that Mr. Richmond said 80 per cent. of his total number of consumers lived in houses of such a type that there was no room for a gas-cooker. In his (the speaker's) district, the position was reversed; for his consumers were chiefly wealthy people—the average consumption per meter being about 44,000 cubic feet per annum. Knutsford was an old-fashioned town, very conservative in everything, with no building going on, and no likelihood of any. When he went to Knutsford, the only appliances let out on hire were cookers. The first thing he did was to reduce the rent of them to 1s. per quarter, irrespective of size. The result was that in three years the number increased from 110 to 218. The next step taken was to supply free of charge slot-meters with grillers. They had installed 180 in the last two years. With regard to gas-fires, most of the residents owned their own, so not much had been done in this direction. After tackling the gas-fire trade, he next turned his attention to the cottages, and piped a large number; the result being that they had increased their consumption by 17 or 18 per cent. All this had been done in three years, and without the aid of a show-room. Mr. Richmond had spoken of a uniform calorific power both day and night. At Knutsford, he had been materially helped, he considered, by maintaining a uniform pressure day and night, because wealthy people often had parties and dinners extending well into the early hours of the morning.

The PRESIDENT observed that the great advantage of having a paper of this description was that all could learn something from the experiences of others, however small the works might be. To

his mind, the best advertisement they could have was a satisfied consumer.

Mr. RICHMOND briefly replied to one or two of the points which had been touched upon by the various speakers; thanking all of them for the various hints they had given him. He did not agree with Mr. Tooley's remarks with regard to the price of gas to large and small consumers. He was rather in favour of a sliding-scale system being adopted—the more they used, the less they paid per 1000 cubic feet. He thanked Mr. Kendrick for his valuable remarks about the card-index system. He had had this question under consideration; but, in view of what Mr. Kendrick had said, he would not now lose sight of it by any means—it was one of those things that were waiting to be done. He was interested to hear what he said with regard to "caring for his consumers" at Stretford, and the splendid results he obtained. Replying to Mr. Mottram's question *re* wash-boilers, he said that as a rule they endeavoured to persuade the consumer to have the wash-boiler without a flue, so that it could be moved about the house as required. They had no room to fix appliances anywhere in Heckmondwike under existing conditions. Nearly everyone, however, had a piano. He often thought a cooker in its place would be a great deal better. Mr. Mottram thought he (Mr. Richmond) had said the show-room was the best advertisement. He had, however, said a satisfied consumer was the best. At Heckmondwike, they supplied slot cookers free; and as discount for power, they reduced the price to 2s. 1d. They had no very large users at Heckmondwike. With regard to Mr. Hudson's suggestions about fixing gas-fires free, he could not agree with him, because there was no guarantee that the consumer would use the fire. Some people would have them put in for the sake of ornamenting the grate. The education of gas-fitters was, as Mr. Hudson had said, an important matter. His own experience of men locally trained for the work had, however, been highly satisfactory up to now. Finally, he congratulated Mr. Robinson on his excellent figures of 18 per cent. increase in three years. He had not overlooked the question of uniform pressure; but the Heckmondwike district was like a switchback, and it would be a difficult matter to maintain a uniform pressure with so large a mileage of mains.

The PRESIDENT said they had had an excellent paper and a thoroughly good discussion. He moved that the meeting tender Mr. Richmond their heartiest thanks.

Mr. J. H. BREARLEY seconded the motion, which was carried unanimously.

Minimum Wage in Operation.

A recommendation is made, by a correspondent of "The Times," to those who are desirous of seeing the principle of the minimum wage extended by law to other callings, to take careful note of its working in the mining industry—and particularly in the Durham and Northumberland coalfields at the present moment. That from the first the men have been disappointed with the working of the Act is clear; and with the revision that has just been made of the awards, after twelve months' working, the dissatisfaction has found loud expression. This revision, except in the case of the boys, has left the minimum wage rates of the previous awards untouched; but inasmuch as since these rates were fixed there have been several advances of wages conceded, the contention of the men is that the minimum should be subject to variation, and that they ought to receive the benefit of increases in the percentage on the standard. That the Act is not entirely free from ambiguity on this point would appear from the fact, pointed out by the correspondent, that though in this field a specific ruling has been given that the Act does not admit of the addition of the percentage, in South Wales the Chairman of the Board has adopted the view of the men. The Executive of the Durham miners have decided to appeal to the President of the Board of Trade against the award which covers their area; and no doubt more will then be heard of their case. Another matter upon which the men are expressing dissatisfaction is the refusal of the Chairman to modify the district rule which applies to both the coalfields referred to, with regard to a workman forfeiting his right to wages at the minimum rate if he absents himself from work on any day without leave or reasonable excuse. The rule is less stringent in other districts; but the hours worked in these two counties are shorter than elsewhere.

Southern District Association of Gas Engineers and Managers.—The autumn meeting of this Association will be held on the 20th inst., at the Hotel Cecil, Strand, W.C., under the presidency of Mr. H. O. Carr, the Engineer of the Wandsworth, Wimbledon, and Epsom District Gas Company. According to the notice issued by the Hon. Secretary and Treasurer (Mr. W. E. Price, of Hampton Wick), the members will take tea together at half-past three, and the business will commence an hour later. This will consist of the election of the President, Vice-President, and office-bearers for the ensuing year, the reception of the report of the Commercial Section, and the reading and discussion of two papers—one by Mr. H. W. Woodall, of Bournemouth, on "Some Economies in Gas-Works;" and the other by Mr. R. P. Harris, of the Commercial Gas Company, on the "Extraction of Tar and Water Vapour from Carburetted Water Gas."

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

A Meeting of the Scottish Junior Gas Association (Western District) was held in the Glasgow and West of Scotland Technical College on Saturday. Mr. JOHN WILSON, of Falkirk, was in the chair, and the principal business transacted was the reading and discussion of the following paper by Mr. JAMES B. STEWART, of Glasgow.

NOTES ON THE COMMERCIAL AND DISTRIBUTION SIDE OF A GAS UNDERTAKING.

When I chose this subject for my paper, I did so for two reasons—firstly, because it is a subject in which I am very much interested; and, secondly, because I have some experience of it, and because it is only by an exchange of ideas and experiences that we can learn from and help one another, which should be the object of our Association. For the purpose of making the paper more easily understood, I will divide it into two parts—the first dealing with the policy of a gas undertaking in relation to its consumers, from a business standpoint; the second dealing with the industrial organization of a distribution department.

PART I.—POLICY OF A GAS UNDERTAKING IN RELATION TO ITS CONSUMERS.

In the early days of the gas industry, and even until lately, the policy of almost all undertakings with regard to the selling of gas was on what I will call the "Take it or leave it" principle, and no attempt was made to popularize its use in any shape or form. Now, on the advent of other forces for generating light, heat, and motive power, the spirit of competition is with us, and, as a consequence, the "Take it or leave it" principle is abandoned, and the policy of many undertakings is to-day in the process of evolution. It is therefore our duty to think out and discuss what principle should be adopted; and while we may not agree with one another—I am quite sure we shall not—we shall at least, by discussing matters, be helping each other to face these problems.

We are in business as sellers of a commodity, and we wish to impress the following information on the general public—viz., "that the commodity we are selling is useful, labour-saving, hygienic, and cheap—comparing more than favourably with any of its competitors. How are we going to achieve this? By advertisement. This is one very important way in which it can be done. The British Commercial Gas Association is in being for the purpose, and is doing useful work in assisting to popularize gas; but in each locality something more is needed.

Show-rooms, where the various appliances can be seen working, have been installed now for a number of years in many of our cities and towns. Popular lectures and demonstrations have been delivered on the uses of gas from time to time. Exhibitions have been, and are being, held all over the country; and what, in my opinion, is a bad business principle to adopt has also been done by some undertakings to increase the use of gas—viz., that of supplying, equipping, and maintaining appliances free of cost to the consumer. This is a point which I wish to bring forward most particularly. As I believe there is no body better able to furnish and equip gas appliances than a well-organized gas undertaking, I think it is the duty of every undertaking to see that the gas consumer is getting not only the best appliance for his purpose, but also that it is being maintained and used in the most economical manner.

The policy with regard to this work of a distribution department, however, ought to be one which is governed by business principles; and, as there cannot be any legitimate charge for appliances and their maintenance against either the manufacture or the distribution of gas, this part of the department's work ought to stand by itself and pay for itself. I do not agree with any proposal that the price of gas should include a free supply of gas appliances and free maintenance; and I ask: Are those undertakings that have inaugurated the system of free appliances prepared to go to the logical conclusion of their line of policy, and supply to the consumer of gas and maintain appliances for lighting, cooking, heating, and motive power which will suit his purpose, and include in the price of gas the charge for them? If so, the tendency is that the price of gas will rise, and the small consumer (who, after all, is the backbone of any undertaking) will find that he cannot afford to use gas for either cooking or heating, and he will revert to coal for both purposes. He will also find that in his gas account he is being charged for the upkeep of a considerable portion of the larger consumers' appliances. Thus, any increase in revenue at the present time will diminish to a great extent when the occupiers of small houses and small business premises realize their position in relation to gas supply.

APPLIANCES TO BE SEPARATELY CHARGED FOR.

The principles which, in my opinion, ought to govern the policy of a gas undertaking are as follows: All appliances and their equipment should be paid for by the consumer, either by hire-purchase or simple hire inclusive of a charge for maintenance during the period of hire, or by sale outright with a fixed sum per annum charged for the maintenance of all appliances, from the simple incandescent burner to the largest gas consuming apparatus on the market. If this policy were followed, and a well-

organized and efficient staff of workmen kept looking after the work, it would undoubtedly tend to lessen the cost for the upkeep of appliances and the price of gas to the consumer, and very materially increase the revenue of the undertaking. This is the best advertisement for gas: "A good service at a price to suit all consumers."

Centralization of Interests.

The trend of the commercial or business world to-day is in the direction of the combination or centralization of interests, and it is the duty of a gas undertaking to look ahead and prepare for it; for, in the natural course of events, the time is bound to come—perhaps sooner than some of us think—when, if the gas undertaking does not take up the whole business of maintenance, it will be taken out of its hands. As I have already remarked, there is no body better able to do this work than a well-organized gas undertaking.

I have dealt with this part of my subject on general principles, and the policy for each undertaking must, to a certain extent, be governed by local conditions. But, after all is said and done, a strictly business principle ought to be adhered to.

Part II.—The Industrial Side of a Distribution Department.

I now come to the second part of the paper—viz., that dealing with the industrial side of a distribution department, and how it ought to be organized to make it a smooth working part of a gas undertaking. In the first place, I shall take the organization of the outside staff; and, in the second, the organization of the inside staff.

The Outside Staff.

With regard to the outside staff of any large undertaking, it should be necessary, and would be found to save a great amount of overlapping, if it were organized on the following lines:

For the gas-fitting and maintenance department—(*a*) district inspectors, (*b*) district foremen, (*c*) workmen.

For the mains and services department—(*a*) superintendent, (*b*) district foremen, (*c*) workmen.

I shall now detail their various duties. The district inspector should be a man well qualified to discuss with, and advise, all gas consumers and prospective consumers with regard to supply, and should be able to tell the consumer what capacity of meter and size of service would be required for his proposed purpose, what would be the cost (if any) of putting in supply-pipes and meter, and what amount of guarantee (if any) would be required before the supply could be given.

To take the first question, it would be essential that the district inspector should know what would be the total quantity of gas consumed per hour for lighting, heating, cooking, manufacturing, or motive power purposes; also what capacity of meter and size of supply-pipe would furnish this quantity. To enable all the district inspectors to give as nearly as possible the same information to consumers with reference both to this and the other two questions, I would suggest that small booklets should be prepared containing the following tables:

Page 1.—Statement of conditions and price of supply for all purposes.

Page 2.—Table showing size and dimensions of, and supply from, meters at a given pressure.

Page 3.—Table showing diameter of supply-pipes and what quantity of gas they would pass at a given pressure for different lengths.

Page 4.—Table showing what quantity of gas would be required for various appliances at a given pressure.

Page 5.—Table showing cost of all sizes of service-pipes per foot; time and material. (Stair and wall-fitting.)

Page 6.—Table showing cost of all sizes of service-pipes per foot; time and material. (Underground work.)

Some further pages of this booklet could be used to give comparisons as to the cost of gas, electricity, and coal for various purposes; and it could be further extended as necessity might arise. The booklet would, of course, be only for the use of inspectors engaged in this work, or, if desired, by the management of the undertaking. The various district foremen could carry a copy; and they would then be able to answer any question which might be asked by a consumer or a prospective one. Having all this information at his hand, the district inspector would have no difficulty in making the necessary arrangements with the consumer; and, these made, he could give the order for the actual work to proceed.

We now come to the duties of the district foreman; these being to arrange his various jobs to suit the convenience of the consumer, keep all his staff fully employed, carefully supervise all work done, and see that all complaints are thoroughly attended to.

With reference to the second part of his duty—viz., that of keeping his staff fully employed—a great amount of time is often unnecessarily wasted by want of foresight or out-of-date business methods. The district foreman should make out his order for material at least two days before he sends the workman to the job; and then pass it on to the stores department to enable that department to have it sent out to the job, if there is any available place to store it, or, if there is not, to have it all ready to be sent out on the morning the work is to be done. The whole work of a distribution department could easily be organized in this manner, as there is absolutely no economy in paying 9d. and 10d. an hour to a man and keep him waiting for material in a store.

The foreman should always keep as much as possible to the same staff of workmen, getting to know their capabilities in the different classes of work. One workman may be excellent at one class of work, and only moderate at another. Therefore the foreman's duty here is to arrange his jobs so as to get the best out of every workman. I know this cannot always be done; for sometimes there will be more of one class of work than another. But this plan ought to be adhered to as a general principle. I need not dwell on his duty of supervision. This is one of the most essential things—not only to supervise all work done, but to see that the necessary repairs to property are carried out to the consumer's and proprietor's satisfaction, and, as to complaints, to see that they have been attended to and rectified in an efficient manner. His final duty will be to check all time and material which has been used in the various jobs, and hand the finished work over to the clerical staff for costing, recording, and filing.

Organization of the Workmen.—In any department, there will always be necessity for both skilled and unskilled labour; and much economy can be effected by keeping the skilled worker fully employed at his own work, leaving the other to be done by the unskilled worker. Again, a certain number of apprentices should be employed; thus training them in the various phases of distribution work which they might wish to take up, and also incidentally effecting further economy. The work of distribution is a trade in itself; and if gas undertakings would train their own apprentices, these, when their apprenticeship was over, would be efficient members of the staff, and the workmen who had charge of the apprentices would, in showing them how to do this, that, or the other part of the work, take care it was well done. This would always tend to keep the workmanship at a high standard.

Mains and Services Department.—This branch of a distribution department should have jurisdiction over the surveying and laying of mains, all necessary renewals or alterations of mains, and all underground work relating to the supply of gas—thus specializing again in this class of work. The superintendent of mains would require to have a thorough knowledge of estimating for and laying all sizes of mains and services, and also a knowledge of the different varieties of soils, their nature, what action they might have on the pipes, and what steps would require to be taken to protect them against such action as would be detrimental to their life. He must also make himself acquainted with the various localities with regard to underground workings of any kind, so as to enable him to minimize as far as possible any leakage due to such workings. He should have a knowledge of the principles of the construction of drains and sewers, and the laying of water-mains and telephone and electric cables, especially in large cities, where these various services cross and recross one another.

Last, but not least, he should be able to keep his department up to date, as in these days of higher pressures there is a greater need for efficiency and good workmanship. In the larger undertakings it will be necessary to have a staff of district foremen to assist the superintendent in the supervision of this work.

Then you have to consider the workmen in this department, comprising main and service layers with the assistance of unskilled labour for the work of excavating ground, &c. Again I think that specialization is necessary for the different classes of work; and in order to get better workmanship and a body of young men to join this side of the business, I would favour the introduction of an apprentice system for main and service laying—thus raising the status of the skilled worker, and getting young men trained to take the places of those who are main and service layers.

Complaints.—These should be dealt with directly by the distribution department, and a special staff of emergency men kept for the purpose. Again I wish to emphasize this point: Special men ought to be sent to special classes of work. The one difficulty here is that the complainer seldom specifies what is at fault, and the complaint is vague. But it can, and should, be done where possible. In fact, it will sometimes be found necessary to send two different classes of workmen together to attend the same complaint. Each workman on this staff must be an expert in his own particular line to enable him to give satisfaction to the complainer. A satisfied consumer is a standing advertisement for gas as a marketable commodity.

Training the Outside Staff.

No paper on the subject I am dealing with would be complete without some remarks on this very vital matter. I believe that this should, and could, be done most effectively by the gas undertaking itself. Sufficient encouragement ought to be given to the workmen and apprentices to enable them to educate themselves; and this can only be done by making it possible for the present workman and apprentice to qualify himself one day to take over the duties of distribution superintendent.

A knowledge of the theory of distribution is essential to every responsible workman on the staff. I do not wish it to be thought that I am in any way against a training in theory; but if the practical side were studied more systematically, it would be for the ultimate benefit of the consumer, the department, and the workman. To give one instance of what might be done—a workman could be utilized and fitted for demonstration purposes at the expense of the undertaking, and the workmen encouraged to form themselves into a class for the study of the various phases of their work or the different appliances. They could meet once a week or once a fortnight, as might be arranged, and discuss a certain subject—say, the gas-fire: (*a*) How to get proper combustion, or (*b*) how to place it in the best position to heat a room of a given size.

This is only one subject out of many which they could take up and fully discuss among themselves. These meetings, properly organized, and conducted by the men themselves, would have far better results, so far as efficiency is concerned, than lectures by eminent professors, or mutual admiration discussions at gas association meetings. They would not only give the workmen more confidence in doing their ordinary every-day work, but, by causing them to think out these problems for themselves, would be the means of encouraging them to suggest improvements in fittings and appliances. To the interested workman there are always possibilities in the way of increased efficiency or economy; and it is to the benefit of the undertaking to make all these possibilities certainties, by initiating some such system of training.

What we must realize is that while the young workman of to-day has had the advantage of a far better elementary education than the workman of twenty years ago, he is at a disadvantage when compared with his older *confrère* as regards practical training. Twenty years ago a workman was a machine in himself, and was trained in the whole work from start to finish; to-day he is only part of a machine. These modern methods of our industrial system have specialized the work to such an extent that even the apprentice of to-day is being trained in a certain groove; and it is only by a system of practical training such as I have outlined, that he can gain an all-round knowledge of distribution work.

You will find that if the workmen in any line of business are being encouraged to educate themselves, and left to themselves to discuss their own difficulties in their own manner, at least 75 per cent. of them will take it up enthusiastically; but you will not get them to join a class in a technical college which is also being attended by their inspectors and foremen, as this undoubtedly has a tendency to overawe them, and damp their enthusiasm. The workman will not be enthusiastic in his work unless he is interested in it; and he will have no interest in it unless he is encouraged to train himself to understand his business thoroughly.

The Indoor Staff.

Stores Department.—We now come to the organization of the indoor staff; and I will start with the stores department. This ought to be housed in premises large enough to have a place for everything, and everything should be kept in its own place. The single-card system is, to my mind, the best, and should be adopted. With a card for each article kept in stock carefully marked when each transaction takes place, this system will make storekeeping a very much simpler and more accurate business than it is in many places at the present time; and in large undertakings, where stocktaking is a week's work for a large staff of men, the different articles can be checked by the stock-books and work-cards from time to time, to see that the marking of the cards is being kept up to date. The charge of the store ought to be in the hands of a well-qualified man, as a good storekeeper is (speaking metaphorically) worth his weight in gold to any firm; and given the assistance of a staff of fairly well educated lads, the work would be performed in a most efficient manner.

Workshop Organization.—It will again be found beneficial to specialize, and put in charge of the different workshops thoroughly competent foremen—men who have been trained to this particular business, and know what constitutes a day's work, and who will also be able to assist and advise the workmen should necessity arise. The workshops should also be equipped with modern machinery and tools, as it is false economy to stick to an old machine or tool because it is in good order, if there is a new one on the market which can perform two or three times as much work as the old one in the same time.

Clerical Staff Organization.—Such principles as I have already enumerated in dealing with the other parts of the work ought to be put in practice here. Up-to-date business methods of book-keeping, with regard to costing, checking, filing, and keeping records of all work done, should be adopted. Machines, in the shape of type-writing and calculating instruments, are now coming into this class of work; and it will undoubtedly extend its field of operations in the future—thus effecting economy in the routine work of book-keeping, and also relieving the mental strain which the monotonous work of calculation entails.

The chief clerk should keep in touch with all these new methods—getting to know what will suit his department; and if the new method is an improvement on the old one, he should adopt the new. I know there has been in the past, and is to a great extent yet, a feeling against any change of system in any business; but the system we ought to strive for is the one that is most accurate, most economical, and one that will best suit the department.

I have now come to the end of the industrial organization of the department, and wish to say one word in conclusion. Before we can have the perfect harmonious working of the whole, we must have co-operation between all the different units which go to make up the department. If the units are out of sympathy with one another, it will be to the detriment of the department and also the consumer. There can be no progress without co-operation; but if a spirit of sympathy and honest dealing prevails throughout the department from the manager down to the lowest grade of workman, and everyone works for the common good, progress will be made. Then with faith in the power of gas, hope for the future of gas, and charity for one another, we shall do more than command success—we shall achieve it.

COKE-OVEN GAS FOR PUBLIC SUPPLIES IN GERMANY.

A report by Herr Hache, of Gleiwitz, which has been published in the "Journal für Gasbeleuchtung" of the 18th ult., gives particulars, collected in the course of a visit to the works and districts concerned, of the supplies of coke-oven gas by long-distance mains to various towns in the Rhine district and Westphalia. The following particulars are taken from Herr Hache's report.

At present the supplies of coke-oven gas to a distance may be grouped under three headings: (1) the Thyssen main; (2) the main of the Rhenish-Westphalian electricity works; (3) smaller local mains.

The Thyssen main derives its gas chiefly from the "Deutscher-Kaiser" mine, and delivers it to the towns of Barmen, Mülheim, Wesel, Velbert, Mettmann, Neviges, and Wülfrath. The total supply to these towns is 970,050,000 cubic feet, of which about two-thirds is to Barmen. The main of the Rhenish-Westphalian electricity works derives its gas chiefly from the "Mathias Stinnes," and the "Wolfsbank" mines, and the chief towns supplied by it are Solingen, Remscheid, Milspe, Schwelm, Gevelsberg, and Steele. The total output through this main is 664,100,000 cubic feet.

The more purely local supplies include about 600 million cubic feet to the town of Essen, from the "Wolfsbank," "Viktoria Mathias," "Friedrich Ernestine," and "Helen Amalie" mines; about 250 million cubic feet to the town of Gelsenkirchen from the "Rhein-Elbe" mine; about 205 million cubic feet to the town of Bochum from the "Hannover" and "Hannibal" mines; about 80 million cubic feet to the town of Witten from the "Lothringen" mine; about 80 million cubic feet to the towns of Wanne and Eickel from the "Rhein-Elbe" mine; about 57 million cubic feet to the town of Herne from the "König Ludwig" mine; about 35 million cubic feet to the town of Castrop from the "Lothringen" mine; and smaller quantities to three other places from three different mines. All the foregoing supplies are in the Rhine provinces and Westphalia. There are in addition six towns in other districts having local supplies of coke-oven gas. The chief are Lübeck, with 106 million cubic feet; Altwasser, 53 millions; and Sulzbach, 35 millions.

The grand total of all the coke-oven gas supplies is about 3227 million cubic feet. These figures were collected in the early part of 1913; and already there has been a very great extension of the quantities of coke-oven gas supplied to the foregoing and to other towns which have made contracts with the coke-oven works as from the past summer. It is estimated that about 7000 million cubic feet of coke-oven gas are now utilized for town supplies.

The majority of the supplies named above are of quite recent origin; the oldest being that of the small town of Bottrop, which dates from February, 1903, and the towns of Essen and Hamborn, which date from 1905. The great extension in the use of coke-oven gas for town supplies has, however, taken place since 1910. The Thyssen main and the Rhenish-Westphalian electricity works main are connected near Barmen, in order that one may aid the other in case of need.

The author proceeds to give a few notes on the conditions of supply. In twelve cases out of sixteen, the high-pressure main for conveying the gas has been laid by the mine or coke-oven owners, and in only four cases by the town supplied. It is advisable to make the suppliers responsible for the main and for its soundness, and to measure the gas supplied on its entrance to the gas-works. The question of the pressure at which the gas should be delivered to the gas-works is one which must be determined for each case; but, generally speaking, it seems desirable that the suppliers should contract to deliver the gas through a governor and station meter into the holders at the gas-works at the pressure required for filling them.

As regards the purification of the gas, most towns require the gas to be delivered to the works fully purified, so that it is ready for distribution. The contracts generally state in what way the quality of the gas is to be tested at the gas-works or at the coke-ovens. It is essential that the gas should be properly cooled and be technically free from tar and sulphuretted hydrogen. The proportion of ammonia in the gas ought not to exceed 0·875 grain, per 100 cubic feet, and the proportion of naphthalene 20 grains. Some works require the specific gravity of the gas to be determined, while some require that there shall be not more than 2 per cent. of carbonic acid and not more than 3 per cent. of nitrogen in the gas. In such cases, the percentage is to be ascertained by analyses made twice a month.

The tests of quality are best carried out on the gas before it enters the town gasholders, and generally will be made by a municipal official, subject to the coke-works being at liberty to make control tests at the same place. In case of disagreement between the analysts, an umpire is called in. It is generally agreed that the gross calorific power, on the average of the year's testings, should be not less than 5200 calories per cubic metre at 0° C. 760 mm. and dry (545 B.Th.U. per cubic foot at 60° Fahr. 30 in. and saturated), while the minimum should only in exceptional cases fall below 5000 calories (524 B.Th.U. per cubic foot). Sudden fluctuations in the calorific power must be avoided, and should never exceed 21 B.Th.U. per cubic foot. A few gas-works require that the gross calorific power of the gas shall not exceed

6000 calories per cubic metre (say, 628 B.Th.U. per cubic foot). Various conditions are made in regard to the carburetting of gas which is below the standard of calorific power. In some cases the gas-works are allowed a certain proportion of benzol per 1000 cubic feet of gas and per 100 calories deficiency in calorific power; and where carburetting is carried out, as and when required, at the coke-oven works, it is a condition that the carburetting agent used shall be one which will not injure the main, meters, or other apparatus. If an automatic recording calorimeter is used at the gas-works for registering the calorific power of the gas, a copy of the record should be sent each day to the coke-oven works, and provision should be made in case of dispute for tests to be carried out by an independent person.

The temperature of the gas should be recorded before and after the station meter. The station gas meter should have an automatic water-level control, and the valve on any bye-pass to the meter should be sealed, and the coke-oven works should be at once notified in case it has been necessary to break the seal. The gas-meter must, of course, be open to inspection at any time by the representatives of the coke-oven works. In case the station meter fails to record accurately and has to be re-standardized, the quantity of gas supplied during the period of its disablement is frequently estimated from the average record of the fourteen days before and the fourteen days after the interruption.

These notes, the author considers, may serve to give gas-works a good idea of the conditions of this new branch of gas supply. Whether it is advantageous to accept a supply of coke-oven gas must depend on the price at which the gas is offered. Already some large towns obtain coke-oven gas at a price of 8¼d. per 1000 cubic feet, and even less.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Claim by a Landowner for Way-Leave for a Gas-Main.

SIR,—We are an authorized gas undertaking, and have recently laid a main outside our limits, to a village three miles away, by consent only of the road authority. Since then a person has purchased an estate adjoining the highway in question, and he demands a yearly sum of £10 as rent for the ground occupied by the main along his frontage. Are we liable? Assuming that we agreed to pay, or were ordered to do so by the Court, would a Provisional Order override this, and release us from any further payment?

ANXIOUS.

Oct. 29, 1913.

The B.C.G.A. Conference—A Correction.

SIR,—In your report of the very few remarks I made on the excellent paper read by Mr. A. E. Broadberry at the meeting of the British Commercial Gas Association last Wednesday, I am made to say: "Anyone would admit that water heated by gas is as cheap as it can be by a coal-fire." This is an error. I did not say so.

The whole import of all I said was to the effect that I desired evidence or data that would give me some assurance that the economy of gas over coal for water heating, which appeared to me to be assumed by the meeting, was well founded. I am still without such knowledge, which is important to my Company, because we already look after, clean, and keep in order the gas-burners for our customers free of charge. We provide grillers free, fix them, inspect them, and maintain them in a condition of efficiency, also free; and with the exception that we make a small charge for hire, we do just the same with gas-cookers and gas-fires. The work of fixing, inspection, and maintenance is performed by a staff of men trained and instructed largely by the Company.

If we could do the same with water-heating appliances, for reasons that are quite obvious, we should greatly increase the demand for cookers and, of course, for gas. But the dread that, so far as money costs are concerned, the results may not prove satisfactory to our customers, gives us pause, and thus "enterprises of great pith and moment, with this regard, their currents turn awry, and lose the name of action."

Permit me also to say that I am not Alderman, but just plain

W. A. NICHOLLS.

Stretford, Oct. 30, 1913.

Alliance and Dublin Consumers' Gas Company.

SIR,—It is a striking and instructive comparison to make with the Dublin administration and that of the other large gas undertaking in Ireland—viz., Belfast. I have examined the analysis of the Belfast gas accounts for the year 1911-12 with that of the Dublin Company for 1912; and the difference in the expenses on revenue is alarming.

Both undertakings manufacture a large output—Belfast selling for the period named 2,163,420,000 cubic feet, and Dublin 1,467,238,000 cubic feet.

Any gas undertaking of the size of either should enable the management to take advantage of the best brains, plant, and material. Therefore, let us consider how the Belfast (which is municipal) management run their show.

The net cost of gas into the holder was 10d., as against Dublin 13·81d.—a difference in favour of Belfast of nearly 4d. (3·81d.) per 1000 cubic feet sold.

Then a step further. The net cost of gas, including distribution and management (in other words, all revenue expenses), less stoves, &c., was for Belfast 1s. 1·47d., as compared with Dublin 2s. 11·57d.—or a total difference in favour of Belfast approaching 1s. (11·57d.) per 1000 cubic feet sold.

Let me deal with these points more fully. The difference in net cost of gas on the works in the holder, on the basis of Dublin sales, represents £23,292 8s. 0·78d., equal to nearly 25 per cent. of the total profit for the year—viz., £92,601 This is overshadowed by the enormous gap afterwards. The total net difference on revenue account is 11·23d., or outside the works nearly 8d. (7·76d.) per 1000 cubic feet sold—representing £47,440 13s. 10·88d., or more than 50 per cent. of the total profit.

Thus we get the serious difference between these two Irish gas undertakings on the revenue expenses of nearly 1s. per 1000 cubic feet on Dublin sales, or an extra expense in the production, distribution, and sale of gas of £70,733 1s. 11·66d. for the year, representing over 75 per cent. of the Dublin profit. In other words, with Belfast conditions, the gas in Dublin could easily be reduced to 2s. 9d., and the full statutory dividend of 6½ per cent. paid to the shareholders; and last, but by no means least, the sales of gas would be substantially increased.

NONULUS.

Oct. 31, 1913.

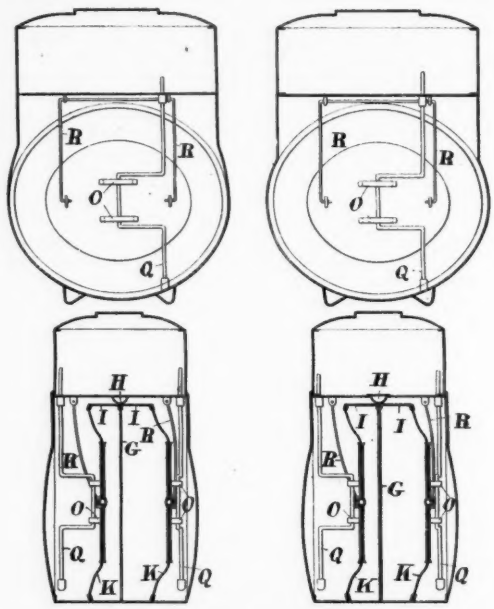
REGISTER OF PATENTS.

Dry Gas-Meters.

FROST, A. C., and WRIGHT, A C., of Witton, near Birmingham.

No. 13,253; June 7, 1913.

This invention relates to the construction of the cases of dry gas-meters whereby "increased capacity and reduction of manufacturing cost are obtained."



Frost and Wright's Dry Gas-Meters.

In the first construction of meter illustrated, the main portion of the case is shaped to form a pair of parallel vertical ends and the external portion of the measuring chambers—the latter being of elliptical configuration. The valve chamber is formed from another single strip of sheet metal which has its ends turned up at right angles to the main portion, and is inserted between the vertical sides, thereby forming the base of the valve chamber and the two opposite sides—the chamber being completed by the two vertical sides. The measuring chamber is divided centrally by a plate G, which at its upper edge has formed in conjunction with it the ordinary gas-channel H. The internal measuring chambers on opposite sides of the partition are each formed partly by a portion of the case and partly by an arch-like piece I, which (in conjunction with the case) forms a measuring chamber of elliptical shape. Into the front of each measuring chamber is soldered an elliptical ring, whereby the flexible diaphragm K is secured in position. The construction of the internal measuring chambers and the lower portion of the case of the meter enables the patentees, it is said, "to greatly increase the capacity of the meter as compared with standard shapes, without increasing the total height of the meter, and also without increasing the width of the upper end of the meter."

In the second construction shown, the lower part of the meter case is formed from two portions, each of which is shaped from a single sheet of metal. When placed back to back, the upper sides of the portions form the base of the valve chamber and the horizontal gas-channel H. The adjacent vertical sides form the central partition G; while the remaining sides form the vertical ends of the measuring compartments and the elliptical portions. The valve-channel is completed by soldering over its upper side a strip of metal; and the valve-chamber at the upper end of the meter is formed either from a single piece of metal strip bent to form the rectangular sides of the chamber, or from two or more suitably shaped strips which are soldered together along their abutting edges.

For transmitting the motions of the diaphragm to the valves and index mechanism, the diaphragms have the usual centre plates. On each outer plate a pair of slotted guides O are formed; and through the guides passes the vertical member of a cranked portion of a vertical oscillatory rod Q, which at its upper end is connected, by the usual levers, with the valve and index mechanism (not shown). The guide-

arms R are suspended from the underside of the valve plate, and the inturned ends are connected to the diaphragm by slotted connecting pieces.

Treating Carbonaceous Materials for the Production of Coal Gas.

ROYSTON, E. R.; a communication from the General Reduction Gas and Bye-Products Company, of New York City.

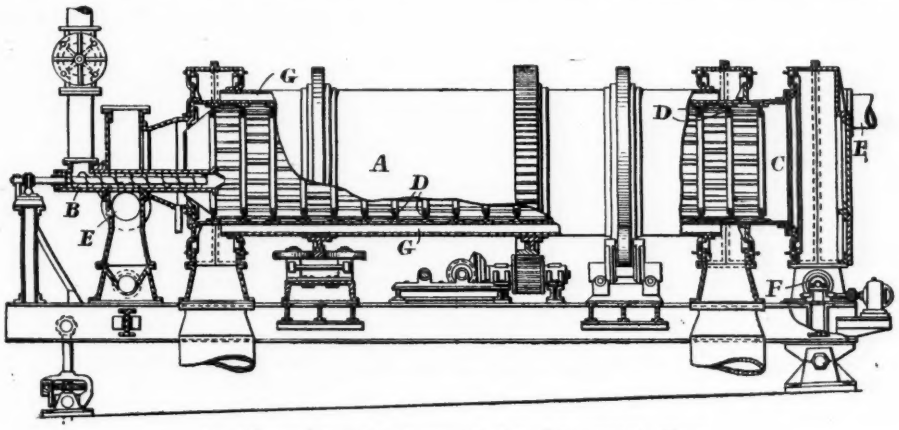
No. 19,100; Aug. 20, 1912.

In patent No. 15,964 of 1911 was set out a method of, and apparatus for, the production of coal gas and water gas, in which the material is dried prior to its introduction into the distilling chamber; and the primary object of the present application is to secure a method of manufacturing coal and like gases from subdivided, but otherwise untreated, carbonaceous materials. This consists in introducing or feeding subdivided, but otherwise untreated, carbonaceous materials into a continuously rotated chamber, showering the subdivided carbonaceous materials in such chamber, and heating them out of contact with a heating medium which is hotter at one end of the chamber than the other. An apparatus is shown in the form which the patentees have found to be preferable for actual use in practising the process; but it constitutes merely one form of apparatus by which the invention may be practised.

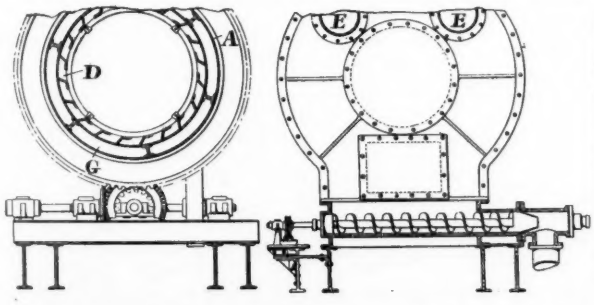
To carry out the process, the cylinder A is started in rotation; and the material to be treated is fed, in a finely-divided condition, into the cylinder through the intake B. The material is advanced by the rotation and inclination of the cylinder toward the discharge end C, but is retarded by the ribs D. "By reason of the rotation of the cylinder and the action of the buckets, the material is broken up and kept in an agitated and subdivided state." In this manner, "the separated particles of the material are constantly and repeatedly impinged upon the surfaces of the flues, by which action the transfer of heat to the material is rapidly and efficiently accomplished—resulting finally in the completion of the desired decomposition, transformation, or change." As the material travels through the cylinder in contact with the walls of the passages, or in juxtaposition to them, "the desired decomposition, transformation, or change is gradually and progressively accomplished."

The coal is treated for the purpose of decomposing it into gas, bye-products, and coke; and the gasification under proper conditions will occur between 750° and 900° Fahr., and instead of remaining in the retort for hours, and a portion only being heated to approximately 2000° Fahr., it will be gasified in a comparatively short time, and "at a temperature approximating the theoretical gasification temperature"—752° Fahr. The rapidity of travel through the cylinder, and the time of exposure to the heat transferring surfaces, is "adjusted to the requirements of the particular result desired." The gas and the bye-products pass out through the gas off-takes E, and the coal being treated is drawn off as coke through the discharge passage F and "can then be used in the manufacture of water gas."

The material moves in one direction through the cylinder (from left to right, as shown), whereas the heat supplying medium moves through the passages G in the other direction (right to left). This arrangement is said to have marked practical advantages in treating subdivided carbonaceous materials, in that the hot air or gas in the passages G causes the heating surfaces at the end of the cylinder at which they enter to be hotter than at the other end of the cylinder—the intermediate portions gradually and progressively decreasing in temperature; so that the material undergoing treatment is subjected to a progressively



The "General Reduction Company's" Coal Gas Making Plant.



increasing temperature as it advances from one end of the cylinder to the other, and when it arrives at the end of the cylinder at which it is discharged is subjected to the highest temperature. The material when it reaches this point is said to be, generally, in a condition more repellent to the action of heat and requiring a higher temperature in order to complete the process. "This counterflow of heating gases and material results in a more efficient transfer of heat to the material, a more effective treatment of the material, and a more complete generation of the gases or vapours therefrom."

It will be noted, the patentees conclude their specification by saying, that the heat supplying medium does not come into direct contact with the material undergoing treatment, or the products thereof, but that the transfer of heat takes place by conduction or radiation. It is obvious that any temperature controlling medium which supplies heat by conduction or radiation, instead of the specific means described, may be employed.

Treating Carbonaceous Materials for the Production of Water Gas.

ROYSTON, E. R.; a communication from the General Reduction Gas and Bye-Products Company, of New York City.

No. 19,101; Aug. 20, 1912.

This invention (which is a pendant to No. 19,100, *supra*) comprises a method of uninterruptedly treating coal and like hydrocarbonaceous materials for the production of water gas, by continuously feeding subdivided, but otherwise untreated, coal or like hydrocarbonaceous materials into a rotated chamber, showering the subdivided coal within such chamber, heating the subdivided and showered coal therein to a progressively increasing temperature and out of contact with the heating medium, and introducing water or steam into the chamber during the heating of the materials.

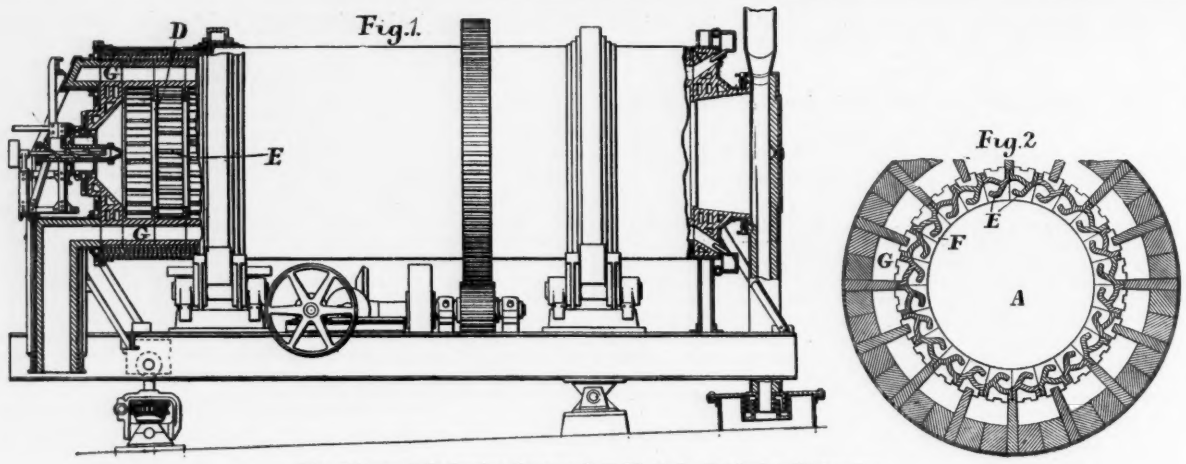
The process is carried out, in the following manner, in the apparatus shown in figs. 1 and 2 on next page.

The cylinder A having been started rotating, the material to be treated is fed into it, in a finely-divided condition, through the intake B. The material is advanced by the rotation and inclination of the cylinder towards the discharge end C, but is retarded by the ribs D; and by reason of the rotation of the cylinder and the action of the buckets E, the material is broken up and kept in an agitated and subdivided state in intimate contact with the steam. Thus the separated particles of the material are repeatedly impinged upon the heating surfaces of the blocks F, by which action the transfer of heat is "rapidly and efficiently" accomplished—resulting finally in the completion of the desired decomposition, transformation, or change. As the material and the steam travel through the cylinder in contact with the walls of the flues G, or in juxtaposition to them, "the desired decomposition, transformation, or change is gradually and progressively accomplished."

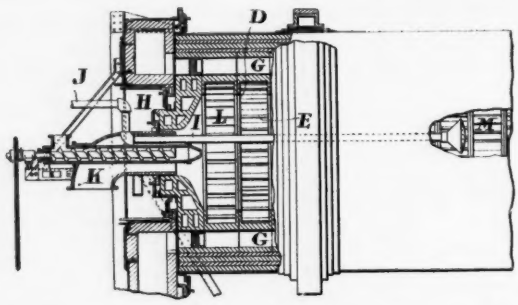
Steam is admitted into the cylinder in sufficient quantities to convert the carbon of the material into carbon monoxide by its combination with the oxygen evolved on decomposition of the steam. "Since the material treated is not in form a compact mass, it is not necessary to force the steam through the material in a blast—a steam atmosphere being all that is required." While the introduction of steam into the cylinder is described, water may, it is pointed out, be introduced which will be readily converted into steam; since the contemplated temperatures within the cylinder are from 1800° to 2000° Fahr. or even higher. When desired, the gas may be carburetted by introducing oil into the chamber through the intake B, or through the pipe with the steam.

The material, when treated, moves in one direction through the cylinder (from left to right, as shown), whereas, the heat-supplying medium moves through the flues G in the other direction (from right to left) for the reason mentioned in patent No. 19,100.

Fig. 3 is a modification adapted for the manufacture of both coal gas and water gas in the same cylinder. This cylinder is similar to that shown in fig. 1 except that as the feed end H, at which the coal is admitted, is more remote from the source of heat, the heat in the cylinder will diminish towards the feed end—thus supplying a lower degree of heat for making coal gas and transforming the coal into coke, while the opposite end of the cylinder supplies a higher degree of heat for making water gas. At the feed end of the cylinder is the steam pipe I, to which steam is supplied through the tube J. K is an off-take through which part of the gas (consisting chiefly of coal gas) is drawn off, while the rest of the gas (chiefly water gas) is withdrawn through the discharge opening at the opposite end of the cylinder. If desired, however, all the gas—that is, coal and water gas mixed together—may



The "General Reduction Company's" Plant for Producing Water Gas.



be withdrawn through either opening. It will be seen that the coal gas will be generated in the part of the cylinder marked L, and that the material, on becoming coked, will be advanced into the part M, in which an atmosphere of steam is maintained. The gas produced in this latter part from the coked material will be water gas; and this may be carried off through the discharge opening, while the waste or ash may be passed through a water seal into a tank, as described above.

An important advantage claimed for the invention is "the continuous operation of the apparatus, which can be run for an indefinite period, since the material and the steam or water are fed in continuously, and the gaseous and other products are discharged in the same manner."

Coin-in-the-Slot Meters.

Boult, A. J., a communication from Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz, of Paris.

No. 20,991; Sept. 14, 1912.

This invention relates to coin-freed meters of the type in which the opening and closing (and the duration of the closure) of the device controlling the supply of the medium are controlled by "differential mechanism having loose or satellite pinions which receive reverse proportional movements" according as they are actuated by the coins inserted or by the measuring mechanisms of the meter.

The coins successively inserted are received in a drum, rotate with the latter when the handle is operated, and move respectively, to the extent of one tooth, a ratchet wheel secured to one of the wheels of the satellites or pinion gear. The first coin introduced brings about the opening of the valve operated by a lever, which, in its turn, is shifted by a driving finger made in one piece with loose pinions. Whenever a new coin is introduced after the first one, the finger is moved farther and farther away from the lever, so that the angular distance separating it from the latter is in proportion to the number of coins which have successively acted on the mechanism. As the meter delivers gas, the loose pinions (and consequently the driving finger) travel in the direction opposite to that of the movement which has been imparted to them by the coins—a distance which is obviously in proportion to the number of revolutions of the measuring device, and consequently to the volume of gas supplied. When the finger, thus moved by the measuring device, returns to the position which it occupied before the introduction of the first coin, it produces a closing of the valve. It is obvious that, in these conditions, it is possible to regulate the ratio of the toothed wheels transmitting to the loose pinion train the movement of the measuring device, in such manner that the valve, once opened by the introduction of one or more coins, would not close until the apparatus has supplied the quantity of gas corresponding to the amount paid in advance.

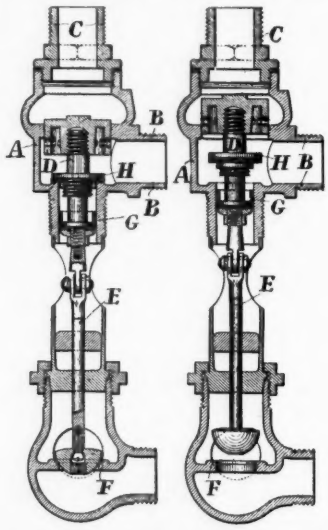
The present invention provides means for preventing fraud in meters of this type, consisting in an interlocking mechanism arranged between the coin drum and the driving ratchet wheel of the differential train, and comprising a stop lever which co-acts with a projection on the coin drum in such a manner as to prevent the coin drum from being turned back after a certain portion of its rotation has been performed. This mechanism is said to have the advantage over other similar arrangements in which a stop lever or pawl prevents the turning back of the drum by dropping behind the coin itself after the drum has been rotated through a part of its travel, that fraud by means of notched coins, adapted to clear the lever or pawl, is rendered impossible. The invention also comprises other fraud-preventing means consisting in an arrangement for driving the stem of the valve and locking it when in the open and closed posi ions, by means of the differential mechanism. The arrangement is not further described apart from a series of five sheets of fully-lettered detail drawings.

Valves for Controlling the Gas to Geysers.

Barralet, E. T., and the Parkinson Stove Company, Limited, of Birmingham.

No. 29,518; Dec. 23, 1912.

This invention relates to valves for controlling the supply of gas to water heaters or geysers. It comprises a valve in a chamber in the water supply or outlet pipe, directly coupled to the gas-valve by a rod, so that when the water-cock is turned on the flow of water operates the controlling valve in the supply pipe, which thereby opens the valve.



Barralet's (Parkinson's Gas-Stove Company) Gas Valve for Geysers.

The illustration represents a vertical section through the automatic gas controlling device referred to, together with the gas-controlling valve, shown closed and with the water-cock turned off; also a similar view with the valves lifted from their seatings in the position they assume when the water-cock is turned on.

The water supply or outlet pipe of the geyser is formed with a chamber A, provided with an inlet branch B, and (at the top) with an outlet branch C. An integral horizontal partition is formed between the inlet and outlet branches having a central circular opening within which is fitted a vertically-moving piston valve formed with a depending flange provided with holes. It is carried upon a vertical rod D passing through an open neck or branch on the underside of the valve chamber. The lower external end of the valve stem is directly coupled by a bolt to the actuating rod E of a gas-valve for controlling the supply of gas, and arranged to normally rest on its seating F when the water-cock is closed so as to cut off the supply of gas. To prevent any water escaping past the cup leather G when the water supply is cut off, the stem D also carries a supplementary valve H, in the form of a faced disc or collar, which, when the piston valve is lowered and the gas-valve is closed, engages with a seating (at the bottom of the valve chamber A) surrounding the opening through which the valve stem passes.

In action, when the water-cock is turned on, the water entering the valve-chamber acts upon the underside of the piston valve and lifts it so that the holes in the depending flange come above the top face of the horizontal diaphragm and allow the water to pass away through the outlet branch C. The lifting of the valve takes the supplementary disc valve H off its seating, and also opens the gas-valve to allow gas to pass to the burner. When the water-cock is closed, the pressure of the water on each side of the piston valve becomes equal, and the

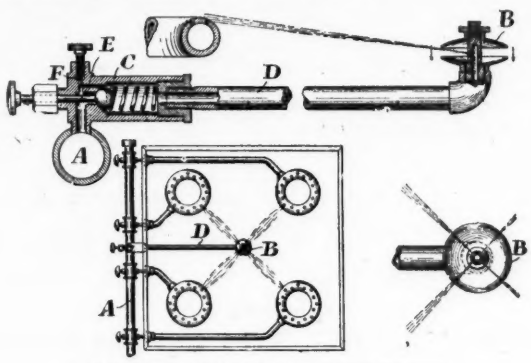
valve falls, by reason of the pressure of the water on the cup leather G, and also owing to gravity; so that the gas-valve cuts off the supply of gas. The supplementary disc valve is also closed on to its seating, and so prevents water leaking past the cup leather on the valve stem.

Gas-Igniters.

KAHN, R., of Milwaukee, U.S.A.

No. 8274; April 8, 1913.

This gas igniter is one of the class adapted to be centrally located between a number of burners, and by which the gas, when turned on to any one or more of them, is instantly ignited by jets of burning gas from the central igniter. The invention consists in providing a central chamber into which the ports of a branch duct open, "so as to accurately direct the pilot lights towards the burners to be ignited when the flash is given" and to give a flash to the pilot light.



Kahn's Gas-Igniter for Stoves and Burners.

The illustration shows an igniter connected with the top of an ordinary stove, a side view (part in section) of the igniter removed from the stove, and a top view of the central chamber of the igniter.

The gas is led from the main supply duct A to the chamber B. A ball valve C controls the passage of gas. It is normally retained in its seat by the recoil of the spiral spring which is interposed between the ball valve and the reducing coupling beyond. The valve C is adapted to be opened by pressure upon the push button shown.

A large volume of gas is admitted to the chamber B by opening the ball valve, and a pilot light is adapted to be maintained in the chamber, whereby, when the valve is opened, the gas is instantaneously ignited when it flashes out radially.

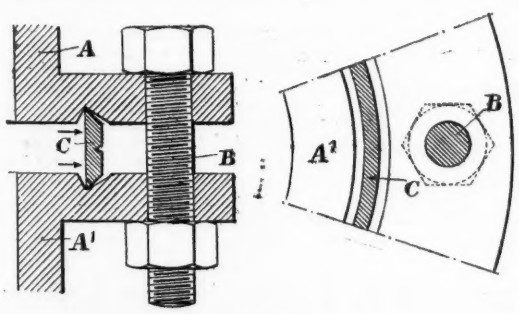
The pilot lights are constantly maintained by gas sent through a bye-pass E. When, however, a larger volume of gas is admitted to C by opening the ball valve, the gas is instantaneously ignited and caused to flash outwardly radially as described "for the purpose of lighting the gas in any one or more of the several burners." The passage of gas through the bye-pass is controlled by the needle valve F, which is adjusted forwardly or backwardly by a threaded member with a knurled head. There are radial ports through which the gas escapes from the central chamber "for maintaining both the pilot lights and producing the radial jets of flame by which gas is ignited in the several burners."

Joint for High-Pressure Pipes or Mains.

THOMPSON, W. P.; a communication from Société Anonyme des Etablissements Poulenc Frères, and L. Pechiney, of Paris.

No. 12,687; May 31, 1913.

In pipes or mains intended for gas, liquids, or vapours at high pressure, great difficulty has always been experienced, the patentees point out, in obtaining a joint between the various sections or elements which will remain tight in spite of the deformations, expansions, &c., to which the parts are subjected. The present invention has for its object "to provide a packing which yields, in such cases, a perfect result; the joint remaining tight for an indefinite time under any circumstances."



A French High-Pressure Gas-Joint.

The joint illustrated in vertical and horizontal section is obtained by a ring C being gripped between two elements A A¹ by means of nuts and bolts B, sleeves, and the like; the ring being gripped in two half grooves, one of which is formed in each of the elements. This is a known arrangement; but the essential feature of the present invention consists in the fact that the outer sides of the grooves and the adjacent parts of the packing member C are inclined to a line parallel with the axis of the pipe—that is to say, form parts of conical surfaces co-axial with the pipe. The angle of inclination of the groove side is, however, greater than the angle of inclination of the side of the packing piece.

The packing must be of a sufficiently malleable substance to fit into the groove and to follow the irregularities of its periphery; but it must not be entirely crushed or flattened.

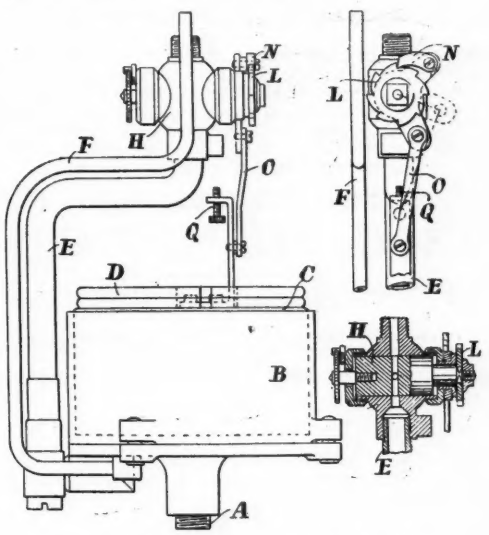
Under the action of internal pressure (in the direction of the arrows) the packing ring C bends, and its inclined faces come in contact with the faces of the grooves in such a way that "the greater the stress, the more intimate and extended will be the contact, and the greater the tightness." The packing, it is said, acts to a certain extent like a flanged or cupped leather washer. It may be made of copper, brass, bronze, malleable iron, and the like, but not of lead or other too plastic material. An external circular incision further allows, if necessary, of a certain flattening by the compression.

Gas-Lighting Apparatus.

FROST, A. C., and WRIGHT, A. C., of Witton, near Birmingham.

No. 10,381; May 2, 1913.

This apparatus, for automatically turning gas on and off alternately by momentarily increasing the pressure of the gas in the main, is of the kind which comprises a loaded and guided bell float or gasholder adapted to rise and fall in a liquid seal on changes of pressure, and in which the gas-valve controlling the burner is so formed that when rotated through one part of a revolution it will turn on the gas, which can then be lighted by a bye-pass flame, and when rotated through a further part of a revolution will turn it off.



Frost and Wright's Lamp-Lighting Apparatus.

In the illustration A is the main delivering to the double wall chamber B. Between the walls of the chamber a fluid-sealing medium is introduced, into which dips the bell float C carrying removable weighted discs D. The burner pipe and bye-pass tube are marked E and F respectively. The valve H is retained in position by caps adapted to screw on to the ends of the casing, with a spindle projecting through one cap. Attached to its end is the ratchet wheel L. Loosely mounted on the spindle is a bell crank, on one arm of which is pivoted a pawl N taking into the teeth of the ratchet wheel. The other arm of the crank is pivotally connected to one end of a link O, which is connected at its other end to a rigid rod secured to the top of the bell float, so that as the float rises the pawl N will turn the ratchet wheel one tooth each time, and thus open or close the valve alternately.

The upper end of the rod is fitted with a regulating screw Q, the end of which is adapted to abut against the valve casing. According as the end of the screw projects further from the rod, so is the movement of the lever and pawl and ratchet mechanism limited. In this way, the length of stroke of the pawl or the angular movement of the ratchet wheel can be regulated.

Diaphragms for Gas-Lighting Apparatus.

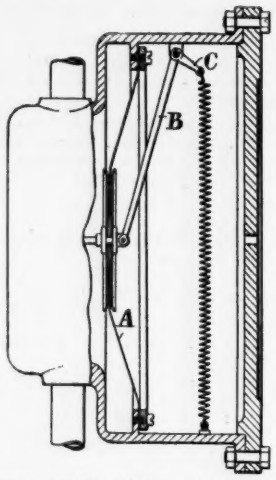
BERLIN-ANHALTISCHE MASCHINENBAU-AKTIEN-GESELLSCHAFT, of Berlin.

No. 13,604; June 12, 1913. Convention date, June 26, 1912.

This invention relates to gas lighting apparatus (actuated from a distance by variation in the pressure) of the kind in which the diaphragm against which the pressure of gas operates is connected to its loading spring by a system of levers, with the object of reducing as far as possible the extent to which the loading spring itself moves when the diaphragm is deflected.

Within the casing of the device (p. 448) is secured a diaphragm A, carrying a central rod by means of which its movements (caused by changes in the pressure of the gas) are transmitted to the mechanism operating the gas-burner valve. To the centre of the diaphragm is connected the long arm B of a bell-crank lever pivoted to the wall of the casing; the short arm C of the lever being connected to one end of a tension spring, the opposite end of which is secured to

an eye connected to the lower wall of the casing. The relative lengths of the arms B C of the lever, whereby the motion of the diaphragm is transmitted to the spring, is so calculated that when the diaphragm is outwardly deflected by the pressure of the gas the spring makes the smallest possible movement. "Consequently, the least possible force is required to stretch the spring when the diaphragm is outwardly deflected, and as a result the energy of the gas acting upon the



A "Bamag" Gas-Lighting Arrangement.

diaphragm when the burner operating mechanism is actuated is more efficiently utilized than in the case of a spring acting in direct opposition to the outward movement of the diaphragm. When the spring directly engages the diaphragm, it is extended to a much greater extent than in the present instance; and as the tension of the spring increases as the latter is extended, a correspondingly increased counter-pressure of gas acting on the opposite surface of the diaphragm is required."

LEGAL INTELLIGENCE.

NUISANCE FROM A WELSH GAS-WORKS.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Tuesday, Oct. 28.

(*Before Mr. Justice* JOYCE.)

Wood v. Mayor and Corporation of Conway.

To-day the hearing was concluded, and judgment given, in the action brought [*ante*, p. 361] by Mr. Albert Wood against the Corporation of Conway, for an injunction and damages in respect of an alleged nuisance caused by them in the manufacture of gas.

Mr. CUNLIFFE, K.C., and Mr. TOMLIN appeared for the plaintiff; while Mr. HUGHES, K.C., and Mr. OWEN THOMPSON represented the defendants.

Mr. HUGHES (continuing his address on behalf of the defendants) referred to the evidence and correspondence to show that Mr. Wood had never made any complaint of nuisance outside an area of 200 yards of the gas-works, and, further, that no nuisance at all had been proved to plaintiff's health or comfort, and said that therefore the claim, so far as it related to this, should be dismissed with costs. There was no case in the books which enabled a person to say that, though there was no nuisance at present, if he built on his land later on there would be a nuisance, and therefore he was entitled to relief. Even assuming there was some slight damage to vegetation, this could be amply compensated for by a small monetary payment; and the Court should not grant an injunction.

Mr. THOMPSON followed on the same side.

Judgment.

His LORDSHIP (without calling on Counsel to reply) then proceeded to deliver judgment. He said plaintiff brought his action for an injunction to restrain a nuisance caused by smoke and fumes emitted in the manufacture of gas, and discharged over his property. There was no statutory claim on the part of the defendants of a right to commit a nuisance; and there was no question that smoke and fumes were emitted. The only defence was a denial of the fact that the effect or consequence of what they did was so offensive or injurious as to amount in law to a nuisance. According to the evidence, it was certain that at periodical intervals, when the retorts were drawn and charged, there was for some minutes a discharge of sulphurous fumes at the level of the ground, and also sulphurous fumes caused by the slaking of the coke. From the chimney 38 feet in height, connected with the retort-house, there was during the whole of the 24 hours of the day a discharge of hot fumes caused by the carbonization of coal in the retorts. It was proved beyond all question that the smell and fumes, both from the retort-house and the chimney, were necessarily and naturally carried by the wind over portions of plaintiff's property. The defendants contended that, inasmuch as no serious, or great, personal discomfort to the plaintiff himself or other persons was shown, there was no such damage as to render the carrying on of the gas-works a nuisance; and that it was true that at the present time there was no house belonging to plaintiff so near the gas-works as to cause the smoke and fumes to be a serious annoyance to the plaintiff. But the trees which had been planted to blot out the view of the gas-works were dying at the top, and, generally, their growth was interfered with by the smoke and fumes. Of this, his Lordship entertained no doubt whatever. It had been boldly suggested that this state of things was to be attributed to the breezes from the sea; but it could not be overlooked that other trees on the estate nearer to the sea had not been injured. In his opinion, the only cause of damage to the trees was the smoke and fumes which came from the gas-works. Having regard to all the circumstances, he was unable to say that the damage which had been, and was being, occasioned was so trivial as to disentitle the plaintiff to maintain the action. Was it reasonable that the defendants should retain the retort-house and chimney in such a position that the air was polluted and plaintiff's property considerably depreciated? He thought it was not, and said he had come to the conclusion that it was possible for the defendants, without purchasing land, and without much expense, to make such alterations in their works as would remove all ground of complaint. Accordingly, there must be an injunction to restrain the defendants from carrying on their gas-works in such a manner as to occasion nuisance to the plaintiff or damage to his property. The operation of the injunction would be suspended till April 30, 1914.

Mr. HUGHES asked that the suspension should be for a longer time, as the defendants would have to consider their position. He suggested that it should be until June 30.

Mr. CUNLIFFE not objecting to the extension,

His LORDSHIP suspended the operation of the injunction until June 30 next, and ordered defendants to pay the costs of the action, and to pay the plaintiff 40s. damages.

Mr. R. G. Shadbolt, of Grantham, writes to point out that in the report of his evidence in the "Conway" case which appeared in the last number of the "JOURNAL," he is made to say: "He did not feel any heat from the chimney, *though he had done so at other gas-works*." The italicized words should read: "Nor had he done so at other gas-works."

CLAIM FOR INFRINGEMENT OF A BURNER PATENT.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Thursday, Oct. 30.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* SWINFEN EADY *and* PHILLIMORE).

New Inverted Incandescent Gas-Lamp Company, Limited, v. Howlett and Co.

This was an appeal by the plaintiffs from the order of Mr. Justice Neville, dated the 4th of February last, dismissing the action with costs. Plaintiffs claimed an injunction to restrain defendants from making, using, or offering for sale articles made in accordance with an invention, the subject-matter of patent No. 5769 of 1900, granted to Josef Bernt and Emanuel Cervenka, and from in any way infringing such patent, which in November, 1902, was assigned to the plaintiff Company. The defendants, who carry on business at Hockley Hill, Birmingham, denied infringement; and Mr. Justice Neville upheld their contention. The proceedings were reported in the "JOURNAL" for Feb. 11, 1913, p. 409.

Mr. A. J. WALTER, K.C., and Mr. GORDON appeared for appellants; Mr. T. TERRELL, K.C., and Mr. HUNTER GRAY represented the respondents.

Without calling upon the respondents' Counsel, their Lordships upheld the decision of the Court below, and dismissed the appeal with costs.

The MASTER OF THE ROLLS said the appeal raised the short point of whether the defendants had infringed the plaintiffs' patent. The invention, as claimed by the patentee, was to enable a bunsen burner to be used upside down. The difficulty of simply adopting the old form and turning it upside down was that the flame used to strike-back. This, to a certain extent, was got rid of by increasing the pressure of gas. But as this could not always be done, the idea was to get a contrivance which could be used with ordinary pressure. The patentees' claim was for a bunsen burner for incandescent gas lighting in which the mantle was suspended head downwards, provided with an insulator, which need not be of non-conducting material, with a deflecting cone on the insulator—the latter terminating in a burner head. The claim was for a combination. The defendants had a bunsen burner, which was common, and a mushroom; but this was not what the plaintiffs claimed. It was quite clear that the claim could not be maintained, it being a mere ornament.

Lord Justice SWINFEN EADY said plaintiffs' claim was for a burner for incandescent gas lighting consisting of a combination which included an insulator preferably made of bad heat-conducting material with a deflecting cone on the insulator. The insulator was not the subject of a separate claim. Plaintiffs complained that defendants had infringed their combination; but the short answer was that, though the defendants used what might be called an insulator, they had not taken the deflecting cone. It was extravagant to contend that the ceramic arms which supported the gallery operated as a deflecting cone. In the defendants' burner, the real deflector was the upper portion; but this was no part of the patentees' claim.

Lord Justice PHILLIMORE concurred.

LIABILITY FOR A GAS WATER-HEATER ACCIDENT.

In the Court of Appeal last Friday, before Lords Justices VAUGHAN WILLIAMS, BUCKLEY, and KENNEDY, an appeal was heard from a judgment of the Divisional Court, composed of Mr. Justice Ridley and Mr. Justice Lush, in the case of *Juler v. Tunbridge Wells Gas Company*. The action in that Court was an appeal by the plaintiff from a decision given by his Honour Judge Parry and a Special Jury at the

Tunbridge Wells County Court in July last year, as reported in the "JOURNAL" at the time; and their Lordships ordered a new trial, though the County Court Judge had declined to do so. [See "JOURNAL" for Jan. 28, p. 261.]

The facts were as follows: In November, 1911, the defendants fitted at the plaintiff's residence a gas-circulator which they guaranteed safe; and on the 4th of February last year it exploded, doing considerable damage to the furniture and household effects, and causing injury to plaintiff's health from shock. When the case was tried in the County Court, two questions were left to the Jury: (1) Did the Company guarantee the circulator to be safe for a domestic household? (2) Was it safe? The Jury found that the Company guaranteed the circulator to be safe; but they could not agree on the second question. After retiring again, they answered it by saying they found the circulator was safe. The Judge did not agree with the verdict; but he said that, as the whole matter had been before the Jury, he did not propose to interfere.

Mr. SANKEY, K.C. (Mr. R. HARKER with him), appeared for the appellants, and submitted that the circulator was lighted when the pipes were frozen, which was an most improper thing to do; and that, there being no breach of warranty, a new trial ought not to be granted.

Without calling on Mr. SIMEY, who appeared for the respondent,

Their LORDSHIPS dismissed the appeal, with costs, on the ground that the County Court Judge had gone wrong in law in not leaving proper questions to the Jury. The questions that should have been left were: (1) Did the defendants give a guarantee? (2) What was it? The Judge ought not to have taken upon himself to discharge some of the functions of the Jury.

OBTAINING ORDERS THROUGH A MISAPPREHENSION.

The Stellorite Company in Court Again.

The "Ironmonger" for last Saturday contains a long report of a case tried at Wellingborough County Court on Monday last week, by his Honour Sir T. W. Snagge, in which Messrs. Heyman and Weinberg, trading as the Stellorite Company, steel merchants, 60, Rue de la Victoire, Paris, sued Messrs. Ellis and Everard, Limited, coal and general builders' merchants, of Leicester and Wellingborough, for £18 2s. 8d.; the claim being made up for one bar of Stellorite steel, 1¼ inches square, at 1s. 4d. a pound, and 164 lbs. of 2¼-inch square supplied to the sawmills of the defendants at Wellingborough. The method of procedure adopted by this Company in obtaining the order was dealt with in the "JOURNAL" last week (p. 370) as well as in the issue preceding (p. 243).

Counsel for the plaintiffs said the order upon which the goods were supplied was dated Feb. 28, 1913, and was given by Mr. Moore, the local manager of the defendants, to a representative, now a partner in the plaintiffs' firm, at the office of the defendants in Wellingborough. So far as he (Counsel) could see, there could be no defence.

The plaintiffs' representative (Mr. Tom Heyman) having given evidence and been cross-examined at considerable length, the defendants' Manager (Mr. J. Andrew Moore) was called. He said he remembered the previous witness calling and saying he had some special steel to sell, and showed him the size of the bars they used. He wrote an order at the dictation of the representative; but in doing so he was not quite clear as to what a metre was. He did not pay the attention he should have done to the order, which was quite misleading to him. The quantity of steel supplied would last them 270 years. He had no idea he was ordering such a quantity. It was quite a misrepresentation. They wrote to the plaintiffs to the effect that the goods were not according to sample, and could not be accepted; and a reply was received that they were sent according to written instructions, and a copy of the order was enclosed.

In giving judgment, his Honour said the order was perfectly plain: "Please supply one bar of Stellorite steel, 1¼ in. square, at 1s. 4d. per lb." Then he found in writing that the length of the bar was about 5 metres; and the manager must either have asked about the metre or he did not. He should have asked what "metre" meant, or left it alone. If he did not ask, he knew he must pay for the goods unless the Stellorite Company, now that the whole thing had been mentioned, would take the steel back.

Judgment was given for the plaintiffs, with ordinary costs.

The Light Brigade.—In view of the November municipal elections, the "Evening Standard" last Friday published the following quip: A provincial municipal candidate was praising the gas department; and hoping to please the electors with a little humour, he said that this policy was "Honour the Light Brigade." "Yes," came the voice of an indignant consumer; "but think of the charge they made!"

Louth Gas Company.—The annual meeting of this Company was held on Monday last week—Mr. B. Hall presiding. The Directors reported that the year had been a most successful one. Compared with the preceding year, there was an increase of 2½ million cubic feet in the quantity of gas made, and of 3,383,600 cubic feet in the gas sold—the latter being an advance of 7·7 per cent. The unaccounted-for gas was at the rate of 6·7 per cent. of the make—an improvement of upwards of 2 per cent. The make of gas was 10,982 cubic feet per ton of coal carbonized; and 10,145 cubic feet per ton were sold—an increase on the year. The gas-rental averaged 3s. 1·83d. per 1000 cubic feet, against 3s. 2·08d. before; the decrease being accounted for by a concession in the charge for public lighting. The net profit was £3283, and the balance standing to the credit of the profit and loss account was £3622. Out of this the following dividends (less income-tax) were declared: On the original capital, 15½ per cent.; on the improvement stocks "A" and "B," 5 per cent.; and on the new ordinary stock (1877), 12½ per cent. This will leave £750 for reduction of the mortgages, and a balance of £785 to be carried forward. The price of gas has been reduced 2d. per 1000 cubic feet from the 31st of August, which brings it down to 3s. 6d. gross and slightly less than 3s. net.

MISCELLANEOUS NEWS.

THE GAS COMPANIES' PROTECTION ASSOCIATION.

The Annual General Meeting of the Association was held last Thursday, at the Westminster Palace Hotel, Victoria Street, S.W.—Mr. H. E. JONES, M.Inst.C.E., in the chair.

The following representatives of the contributing gas companies were present; the names being given in the order in which they appear in the attendance register:

Mr. H. E. Jones (Chairman), Alderman Henry Hart (Canterbury), Mr. W. R. Phillips (Hitchin), Mr. John Andrews (Langley Mill), Mr. George Clarry (Cardiff), Mr. W. Belton (Shrewsbury), Mr. Thos. May (Richmond), Mr. Chas. W. Braine (Wandsworth), Mr. F. W. Cross (Lea Bridge), Mr. J. R. H. Jacobs (Southampton), Mr. W. W. Topley (Croydon), Mr. T. H. Hazell (Newport, Mon.), Mr. A. Caddick (Croydon), Mr. W. E. Price (Hampton Court), Mr. L. Trewby (Mill Hill), Mr. A. W. Brookes (British Gaslight Company), Mr. Gerald H. S Iorns (Ilford), Mr. E. L. Burton (Brighton, &c.), Mr. R. Hall (Matlock), Mr. Edward Allen (Liverpool), and Mr. A. B. Stedman (Reading).

THE LATE MR. C. E. BOTLEY.

The CHAIRMAN (in opening the proceedings) said he desired, in the first place, to ask the members to join with the Committee and himself in expressing sincere regret at the untimely death of Mr. Botley, of Hastings, who died the other day rather suddenly. He should like to put on record—and he was sure the whole Committee desired it—their sense of the great loss the Committee had sustained. Mr. Botley was a most regular and punctual attendant at the meetings of the Committee; and he was a congenial and courteous colleague. He always freely expressed his opinions; but if he happened to be in a minority, he acquiesced in what was before them in a business-like and kindly manner. He certainly was one of the best representatives of the gas industry that they could possibly have; being a man of wide experience and nice personal manner. They would all desire to record their sympathy with his family in their bereavement, and to express their sense of the loss the Association had suffered through his premature death.

Mr. GEORGE CLARRY (Cardiff), as an old colleague of Mr. Botley's on the Committee, desired to second the proposition.

The members signified their assent by silently upstanding.

THE MINUTES.

The SECRETARY (Mr. F. E. Cooper) read the minutes of the fifteenth annual meeting, held on Oct. 31, 1912; and they were confirmed.

LETTERS OF REGRET.

The SECRETARY announced the receipt of various letters of regret at non-attendance; among them one from Mr. Hanbury Thomas, owing to severe illness.

THE ANNUAL REPORT AND ACCOUNTS.

The following report (together with the accounts) were presented:

The Committee herewith present the revenue account and balance-sheet, together with a report of the proceedings of the Association for the year ended Sept. 30, 1913.

The expenditure amounted to £747 12s. 3d. The revenue was: Subscriptions, £519 4s. 6d.; interest on Consols (less tax), £39 16s. 4d.—together £559 0s. 10d., leaving a deficit of £188 11s. 5d.; special costs having been incurred with reference to the proceedings before the Residuals Joint Committee and in opposition to the National Electric Construction Bill, 1912.

The balance-sheet shows that the assets amount to £1962 18s. 9d., which is represented by £1690 16s. 2d. 2½ per cent. consolidated stock at cost price—viz., £1522 11s. 0d.; balance at bank, £436 11s. 8d.; cash in hand, £3 16s. 1d.

The appointment of a Joint Committee of both Houses of Parliament to consider what (if any) restrictions should be imposed on gas authorities with respect to the purchase and manufacture of the residual products resulting from the manufacture of gas by other gas authorities, or of other chemicals, to which the House of Commons had assented at the date of the Committee's last report, was agreed to by the House of Lords.

The Joint Committee duly met in the months of November and December, 1912, and at their first meeting decided to hear Counsel for the Gas Companies' Protection Association and the Association of Municipal Corporations, as representatives of the gas industry. Ultimately, the Association of Municipal Corporations decided to combine their case with that of this Association, by whom, therefore, the proceedings were conducted; the Institution of Gas Engineers contributing £400, and the Association of Municipal Corporations contributing £500 towards the expenses.

The members are no doubt aware of the decision of the Joint Committee; and it is sufficient, therefore, to state that it was entirely in favour of the gas industry.

Pending the report of the Joint Committee, the Model Gas Bill had been amended in accordance with decisions given on various Gas Bills and Provisional Orders of the session 1912; and the Committee therefore instructed the Secretary to call the attention of promoters of Gas Bills in the session of 1913 to the report of the Joint Committee, and to suggest that it should be followed.

The Special Sub-Committee appointed to deal with questions affecting gas companies under Part II. (Unemployment Insurance) of the National Insurance Act, 1911, have continued their labours, and obtained the decision of the Umpire on several points arising under that Act. These decisions have, on the instructions of the Committee, been made public in the technical journals. The work of this Sub-Committee has been onerous; and the thanks of the gas industry are due to the members thereof for their unremitting labours in the matter.

The decision of the Court of Chancery is being sought as to the legality, or otherwise, of the mode adopted by a local authority of charging for electricity supplied by them. The matter being *sub judice*, it is deemed inadvisable to deal with it more fully in this report.

The Smoke Abatement Bill, then pending in Parliament, was considered by the Sub-Committee for General Purposes, who, in conjunction with the Parliamentary Committee of the Institution of Gas Engineers, prepared

various amendments thereto in the interests of the gas industry, which were duly submitted to the Members of Parliament responsible for the introduction of the Bill. The Bill did not pass into law; but it is anticipated that it will be re-introduced in Parliament next session.

The various amendments suggested by Mr. Carpenter on behalf of the Committee, to the draft schedules prepared under the Census of Production Act, 1906, referred to in the last report, have been adopted by the Comptroller-General appointed under that Act.

The principal matters upon which the Secretary has been consulted during the past year are as follows:—

Eligibility of a member of a firm effecting insurances for a gas company to become a director of that company.
Legality of transfer embracing two or more descriptions of stock, and transfer fee payable thereon.
Questions on Part II. (Unemployment Insurance) of the National Insurance Act, 1911.
Supply of gas to public lamps.
Registration of executed transfer of shares, after death of transferor.
Restitution by a gas company of money paid in excess by a consumer.
Necessity for a gas company to obtain a licence to store petrol, &c.
Submission by a gas company of plans of buildings to a local authority.
Right of a gas company to lay a main over a canal company's bridge.
Voting by a director of a gas company being a member of a local authority on questions of public lighting.
Eligibility of former manager and engineer of a gas company, receiving a retiring allowance, to be appointed chairman of such company.
Registration of oil depôts in London.
Questions arising on Workmen's Compensation Act.
Liability of gas company to pay land tax in respect of mains laid in public roads.
Legality of charging bonuses and interest paid under co-partnership scheme as a trading expense for income-tax purposes.
Exemption of geyser from distress.
Right of a shareholder in a gas company to speak at borough council meetings.
Right of a gas company to alter times of holding meetings and making up of accounts.
Questions *re* supply of free burners and alteration of flat flame to incandescent burners for public lighting.
Liability of consumer for damage done to gas-meter by fire.
Right of owner of soil of road to restrain a gas company from laying pipes therein.

Three companies have joined the Association since the last annual general meeting, and three companies having withdrawn owing to amalgamation, the total number of members remains at 119.

The following members of the Committee retire, in accordance with Rule 9: Mr. William Belton (Shrewsbury Gaslight Company), Mr. W. F. Cotton, M.P. (Alliance and Dublin Consumers' Gas Company), Mr. Thomas May (Richmond Gas Company), Mr. S. Y. Shoubridge (South Suburban Gas Company), Mr. Hanbury Thomas (Sheffield United Gas Company), and Sir Corbet Woodall (Gaslight and Coke Company)—all of whom, with the exception of Sir Corbet Woodall, offer themselves for re-election. The Committee desire to record their deep regret that Sir Corbet Woodall finds it impossible to offer himself for re-election.

The Residuals Inquiry.

The Chairman, in moving the adoption of the report and accounts, said the latter were really the most important part of the document now before them. In the past year, they had spent the by no means unimportant sum of £400 in the form of a contribution to the costs of the contest before the Joint Residuals Committee, which had, as the members would remember, such a remarkably good result for the industry—the industry being relieved from the grievous restriction which, by some agency which was chiefly concealed from view, had crept into the proceedings of Select Committees. The sum he had mentioned was a considerable one for the Association; but he thought the members would agree that, looking to the importance of the issue, it was not one they would regret having spent. When he pointed out that the matter was considered so important by the industry at large that the Institution of Gas Engineers (whose funds were necessarily slender, because it was an institution of scientific men, and not a trading association) contributed £400 to the costs, and the Association of Municipal Corporations £500, it would be seen that the justification for what their own Association did was complete. But there still remained £412 9s. 9d. to be found; and before taking this sum from the funds of the Association, he thought it would be desirable that the Secretary should communicate with some companies who were specially interested in the question (because they were already having dealings with each other which conveyed a good deal of profit to both sides) to ascertain whether they would not help the Association specially in regard to this deficiency. The story of the fight was told at length in the report; and therefore he did not think it necessary to supply any further details. The members must, however, see that—when a restriction of this sort had gone the length of being imposed upon several companies (like his own Wandsworth Company and others), and had actually crept into the Model Bill, so that Committees who had to consider Gas Bills took it as a matter of course that it should be inserted in those Bills—it was a very arduous task to get it reversed, although the restriction was one which would have seriously crippled many companies who were relying upon each other for assistance with regard to residuals, and the procuring of acid and other things in which much wider prices were often quoted by outside manufacturers. It was quite a burden that could not be tolerated when any reasonable exertion could remove it. It had been removed.

The Position of the Accounts.

It would be seen, however, from the accounts that the amount spent upon the contest (without the deficiency already referred to) had made a considerable difference in the condition of the finances of the Association, because for the year they had a balance of £188 on the wrong side, as compared with a balance of £92 in the previous year. This was not a satisfactory position; and it indicated the necessity for their having accumulated money with which to meet special expenditure. The balance-sheet showed the amount of the funds in hand—£2151, less the £188 mentioned. Part of the accumulated sum was made up of an investment in Consols, which were priced-out at the cost of £1522. Now they all knew the stock was not worth this sum that day; and if they were a trading company, and had to rely upon anything else but voluntary subscriptions, they would not like to go on with such a value placed upon the investment. But inasmuch as they were not likely—at any rate, for a good many years—to have to realize the fund, there was no harm in leaving the investment at cost. If they did get short of money, they would simply apply to the parties who benefited by their assistance to make good the deficiency. The balance at the bank was £436 11s. 8d.; and the cash in hand was £3 16s. 1d. Thus it was seen that they stood fairly well. The balance in hand last year was £628; and now it was £440. He did not think they need be at all afraid of having to draw upon their balance, by reason of the special expenditure to which he had referred; and he proposed, with the acquiescence of the members, that either himself, the Secretary, or both together, should send round a letter asking for contributions towards the payment of the £400 still outstanding owing to the fight on the residuals question. If response was made to the appeal, it would prevent their balance being drawn any lower.

Unemployment Insurance.

There were other matters the Committee had had to consider. The Special Sub-Committee appointed to deal with questions affecting gas companies under Part II. (Unemployment Insurance) of the National Insurance Act, 1911, had worked very well in that connection; and the thanks of the whole Association were very much due to Mr. Alex. Wilson, the Engineer of the Glasgow Corporation Gas-Works, Mr. George Clarry, and Mr. D. Milne Watson, the General Manager of the Gaslight and Coke Company. He mentioned Mr. Wilson and Mr. Clarry first, because they had approached the subject almost before the Committee were formed. They had done a great deal of yeoman work in paving the way, so that the questions came before the Committee in clear and understandable form; and they had also already impressed the Umpire with what were the rights and the merits of the question from the gas industry's point of view. The members would agree that, on the whole, they could not complain that the Insurance Act had been unduly onerous upon gas undertakings; and for this they owed thanks to Messrs. Wilson, Clarry, and Milne Watson.

Electric Supply Charges and Agreements.

Just at present, a question on which the Secretary was professionally advising, and which the Committee had carefully considered, was an action to determine the legality of the mode adopted by local authorities in charging for electric current where they sought to enforce agreements that excluded the supply of gas. This was a matter that was *sub judice;* and therefore one must not enter into it at the present time.

Census of Production Act.

The report also stated that the Smoke Abatement Bill then pending in Parliament was considered by the Sub-Committee for General Purposes. The Bill, however, was dropped; so that there was an end to that proceeding. With reference to another question, regarding the schedules to the Census of Production Act, 1906, the Association were much indebted to Mr. Charles Carpenter, the able Chairman of the South Metropolitan Gas Company, who drew up a number of amendments on behalf of the Committee, every one of which had been adopted by the Comptroller-General appointed under the Act. There they had the successor of Sir George Livesey following out, as they hoped and believed he would, the example of his forerunner in doing at all times his best for the gas industry.

Questions and Answers.

The next part of the report was the recital of numerous questions which had been submitted to the Secretary by different gas companies; and these showed the appreciation of the members of the services rendered by the Association in obtaining information on such points.

The Membership and Small Companies.

Since the last annual general meeting, three companies had joined the Association; and three companies had withdrawn, owing to amalgamation. This left the total number of members at 119. Regarding the three companies who had dropped out (due to fusion), it was hoped that the amalgamated companies would increase their subscriptions, so that the Association would not lose through the change. While on this point he desired to say that every member should use all the influence he possessed with neighbouring companies to induce them to join the Association. They had a large muster of companies in the membership; but it ought to be larger, and to include companies of all scales. He could not help thinking that it would be wise if the Committee brought forward a resolution by which some of the smallest companies could be admitted by paying a low subscription—at any rate, he should like to have the matter discussed by the Committee. In his opinion, it would be a great advantage, because they did not want the money of these companies so much as their cohesion and general support. It must be borne in mind by companies small and great that the Association never was a fighting one. He was reminded by one member of the Committee that their motto must be "Defence, and not Defiance." The Association would lose their influence and power in getting money from companies, and they would lose their weight in Parliament and in other ways in which they came in contact with the public at large, unless they carefully avoided the idea that they were to attack all questions, and fight them out. They were a defensive and protective Association. So long as they stuck to these lines, they would get assistance and support from the investors in, and from, gas companies, and they would have an influential effect upon the authorities in the various courts and tribunals before whom they came.

The Committee.

They had that day to elect new members for the Committee. Sir Corbet Woodall was not seeking re-election. He (the Chairman) very much regretted that Sir Corbet could not find time to properly attend to his duties as a member of the Committee; but they had the permission of Mr. Milne Watson, the able General Manager of the Gaslight and Coke Company, to put his name before the members for the vacancy. Then, owing to the lamentable death of Mr. Botley, it would be for the members to deal with this vacancy, although the Committee could have done it. But the members could do it now that they were assembled. Candidates for the position were Mr. Edwards,

of Aldershot, Mr. Hazell, of Newport, Mon., and Mr. Stibbs, of the Portsea Island Gas Company. He had great pleasure in moving the adoption of the report and accounts.

Suggestions from Members.

Alderman H. Hart (Canterbury) remarked that the Association had in connection with the residuals question triumphed before the Joint Committee; and there were many gas undertakings who were not subscribers to the Association who would benefit from the work. He thought an appeal should be made to such non-subscribing concerns (he did not say to the smallest) to contribute the £400 deficiency to which the Chairman had referred. He thought they would be justified in asking them to participate in the expenses as well as the benefits, before appealing to those gas undertakings that were already subscribers to the Association. He had pleasure in seconding the adoption of the report and accounts.

Mr. E. L. Burton thought that another way of obtaining the money would be by asking the non-subscribing companies to become members of the Association, and pay subscriptions for the coming year. The important decision of the Joint Committee on the residuals question gave them fresh ground upon which to go; and so the time was very opportune. He thought this plan of making up the deficiency in the contributions to the costs of the fight would be of more permanent benefit to the Association.

Mr. W. E. Price (Hampton Wick) remarked that all who had had anything to do with the Association must be very much struck with its utility and by the work accomplished by it. But he thought the Association suffered very much from over-modesty, and it certainly did not proclaim itself sufficiently. There were some gas companies who hardly knew of its existence. Speaking of its modesty, he noticed on the report that no names were mentioned. People outside did not therefore know of the influential men who were at the head of it, and guided its affairs. The report itself was not signed. People outside did not know who was the Chairman, nor who were the Committee. The only name mentioned on the report was that of their worthy Secretary, who worked so hard, and whose name only appeared on the endorsement. He (Mr. Price) indeed thought it would be to the advantage of the Association if it were better known. The only name at the foot of the accounts was that of Mr. Shoubridge; and it was not stated in what capacity he signed the balance-sheet. While they were all struck with the work the Association were doing, he thought there might be a little more advertisement. It was only by advertisement, and by letting people know what they were doing, that in another Association they found they could get support. Instead of only having 119 gas companies subscribing to the Association, they ought to have at least 50 per cent. of them.

The Chairman said Mr. Price's compliments were most acceptable to the Committee; and he was also entitled to their thanks for his very practical suggestions. The report ought to have had the names of the members of the Committee at the head, and it ought to have been properly signed by the Chairman and the Secretary.

Mr. A. Caddick (Croydon) remarked that a great deal had been said lately regarding the calorific value standard, instead of the illuminating power one. He should like to know if the Committee had had this matter under consideration. A large amount of benefit was conferred upon gas undertakings through the action of the Association in connection with the No. 2 standard burner.

The Chairman replied that the Association could only aid and abet; and they could not exactly take up the position of promoters of legislation. In connection with the removal of the sulphur clauses and the adoption of the "Metropolitan" No. 2 burner, the Association lent every possible assistance to those who were wishful and willing to go forward, and who had to take the initiative. The Committee had lately considered the question; but there were not many companies who were prepared to go forward with a Bill. It had struck most of the members of the Committee that, as there were in existence at least three different forms of calorific clauses, before a plunge was made into a general movement they should know something more about the matter of calorific value. For the best part of a year, he was under the test in the Wandsworth area; and he should like to know a little more about it before he finally nailed his colours to the mast. The clauses of the Gaslight and Coke, Wandsworth, and South Suburban Companies were all different in terms; and until they got a little more uniformity, the Association could not do anything more than put their heads together.

Mr. F. W. Cross (Lea Bridge), speaking of unemployment insurance, thought the Committee should go a little further than they had done in the report. It had been stated that men employed on the works were either insurable or uninsurable. In the Umpire's decisions, he used the words "solely and mainly employed." In many of the larger works, there were men who were solely employed on work that would bring them under the Insurance Act; in the smaller works there were men who were not solely employed on a particular class of work. It was therefore very difficult for the smaller works to decide upon what was put before them—whether or not a man was insurable. For instance, this had been put to him: Would a man who was employed as a bricklayer for a fortnight or a month on end on a new building be insurable for the whole twelve months, or only for the time that he was employed. This was an example of the points that required to be brought forward by the Committee, so as to help the smaller works.

The Chairman pointed out that the words used by the Umpire were not "solely and mainly" but "wholly or mainly." If a man worked for two months as a bricklayer and ten months as a labourer, he would not be employed wholly or mainly as a bricklayer.

Mr. Robert Hall (Matlock) observed that the Chairman had made an observation that the Association was not a fighting one; and he had since repeated it. He (Mr. Hall) represented two companies there that day, and one of them was being made to appeal in respect of a tax in connection with the land in which gas-mains were laid.

The Chairman said that he had connection with perhaps fifty or sixty gas companies, and he had never heard of such a thing before. He did not think they could seriously discuss a matter of this sort, seeing that they had never heard of it.

Mr. Hall: Others have heard of it.

The Chairman said he could assure Mr. Hall that nobody had ever heard of such a thing. He (Mr. Jones) had been in many rating appeals; and he had never heard of it.

Mr. Hall: A very sharp man has made the discovery; and it has been referred to Somerset House, and is now under consideration there.

The Secretary: They have withdrawn it.

Mr. G. Clarry (Cardiff) said he should like to remark, as one who went before the Umpire on many occasions, that he always found him firm and candid, and very desirous of straightening out any difficulty. He (Mr. Clarry) should like to correct the statement as to small companies not having been considered. They were considered; and there was discussion over every possible contingency that they thought might arise on a gas-works, whether large or small. One question that he put to the Umpire was whether a man would be considered to be "wholly or mainly" engaged on work if he was put on to another job one day a week. The Umpire said he would be "wholly or mainly" occupied on the work which engaged the greater part of his time. Then he (Mr. Clarry) put another question, as to whether a man who was working one day a week, and so 52 days a year, on a job, and so was not insurable, would be insurable if he had to do the job continuously for seven weeks. His reply was that if a man was employed in an insurable capacity for seven weeks running he would have to be insured in respect of that period; but if he were employed for 52 separate days in the whole year on the job he would not be insurable. In one case they had to pay; in the other they were exempt. The Act was very difficult to administer; but the Committee would answer any point that might be brought before them.

Mr. Cross remarked that Mr. Clarry had put the matter very clearly, and had, in a few words, answered quite a lot of questions that he (Mr. Cross) had heard from engineers.

Mr. Edward Allen suggested that, instead of waiting until the annual general meeting, if members had any difficulty regarding this matter of insurance, they should write to the Secretary; and the question could be at once dealt with, as the Committee were perpetually sitting.

Mr. W. W. Topley (Croydon) put the point whether the "wholly or mainly" applied to wages, work, or time. If one knew which factor to take, it would help those who had to decide on the spot.

The motion for the adoption of the report and accounts was then unanimously carried.

The New President.

The Chairman stated that with the approval of the Committee, he had written to Sir J. Fortescue Flannery, Bart., M.P., asking him to accept the presidency of the Association, which was resigned by Sir Henry Kimber a year or so ago. It was important that the Association should have a President; and if possible he should be a member of Parliament, and able to accompany at any time a deputation from the Association to the officers of Parliament. He had had a letter from Sir Fortescue accepting the presidency; and he (the Chairman) formally moved that Sir Fortescue be elected to the position.

Mr. William Belton (Shrewsbury) seconded the motion; and it was cordially passed.

The Committee.

Moved by the Chairman, and seconded by Mr. Allen, the retiring members of the Committee were re-elected, with Mr. Milne Watson to succeed to the position vacated (as mentioned by the Chairman in his opening address) by Sir Corbet Woodall.

There were three candidates for the vacancy on the Committee—Mr. R. W. Edwards, of Aldershot, Mr. T. H. Hazell, of Newport (Mon.), and Mr. H. A. Stibbs, of Portsea.

On the motion of Mr. Allen, seconded by Mr. Thomas May (Richmond), Mr. Edwards was elected; Mr. Hazell withdrawing his candidature in favour of Mr. Edwards. Mr. Stibbs was not present.

Thanks to the Chairman.

On the proposition of Mr. May, seconded by Mr. W. R. Phillips (Hitchin), the Chairman was heartily thanked for his courtesy and guidance in conducting the counsels of the Committee, and for presiding over the meeting that day.

TREATMENT OF RESIDUALS AT BURNLEY.

Proposals by the Gas Engineer.

Mr. J. P. Leather, the Gas Engineer and Manager to the Burnley Corporation, has submitted to his Committee a report on the subject of dealing with the residual products; and it will be considered at their next meeting. In the course of it, he offers the following observations.

In the manufacture of gas from coal, the raw material is exposed to the action of heat in a retort in the absence of air. By this means it is converted and split up into a number of different substances, solid, liquid, and gaseous. The relative quantities of these products vary to some extent with the character of the coal. In round figures, a ton of Burnley coal yields: Gas, 380 lbs.; coke, 1450 lbs.; ammoniacal liquor, 250 lbs.; tar, 150 lbs.; retort carbon, 2 lbs.; sulphur and other impurities, 8 lbs. The most important residual, because the largest in amount, is coke. About 30 per cent. of the coke produced is used in the manufacture of the gas for heating the retorts and producing the steam required for various purposes. If all the gas we made were coal gas, we should require to use nearly 70,000 tons of coal per annum, and should therefore have more than 30,000 tons of surplus coke to dispose of. The quantity of coke used by our customers in the borough is, however, not more than 20,000 tons. In our own furnaces we use coke for heating the retorts. These furnaces require to be cleaned out at intervals to remove clinker. The clinker and ashes removed contain from 35 to 40 per cent. of unburnt coke. The weight of these "pan ashes" amounts to not less than 2500 tons per annum, which we have to cart to a tip at a cost of 1s. per ton. My

proposal is to erect plant for washing and screening the ashes. The apparatus would separate the coke from the clinker and dust. The value of the washed coke recovered, the weight of which would exceed 900 tons per annum, would alone pay for the cost of the plant in less than two years. The smallest sized plant would be capable of dealing with a week's production of ashes in two days. I propose to combine with the plant a coke-breaker and screen to sort the coke into three sizes. Such a combined plant, capable of dealing with 10 tons of coke per hour, and delivering the screened coke into bins on the floor, from which it can be filled by shovel into carts, would cost about £800. It would, however, pay, I think, to elevate the screening arrangement to a sufficient height to provide overhead bunkers, from which the coke could be loaded into carts expeditiously without the necessity of again lifting it by shovel. The extra cost in this case would bring the whole cost of the plant to about £1100. The cost of breaking and screening the coke would be more than repaid by charging 1d. per cwt. extra for broken coke. Experience shows that people who have used broken coke are perfectly willing to pay this. I suggest to the Committee that they should undertake delivery of coke to customers in the borough in small quantities to order; the sales being treated as a cash transaction. We should not injuriously compete with hawkers who are at present carrying on an honest business, but who are now very few in number. There is no doubt that the sales of coke would be greater if householders had greater facilities for purchase.

It is most usual in gas-works to manufacture sulphate of ammonia, which is a compound of ammonia with sulphuric acid. For this purpose we distil the ammonia from the ammoniacal liquor by means of steam, adding a certain quantity of milk of lime. The gases are led off into a lead vessel containing sulphuric acid which fixes the ammonia, forming a white salt. This salt is sold through brokers by tender when it is dry. There is no doubt that it is more advantageous to manufacture sulphate of ammonia than to sell the liquor to chemical manufacturers. The process is simple, and the reduction of bulk considerable; 12 cwt. of liquor producing only about 1 cwt. of sulphate. The saving in transit charges is therefore of consequence. The quantity of sulphate manufactured on our works is about 500 tons annually.

Tar, as a residual of gas manufacture, appeals strongly to the imagination of the non-technical observer. It is the source not only of the pitch used in making roads, of greases used for lubricating, of spirit used for driving motors, and for dry-cleaning of clothes, but also of a large number of substances used as disinfectants, antiseptics, dyes, scents, and even valuable flavourings for foods. For distilling tar, large wrought-iron stills are employed, capable of containing from 10 to 20 tons of tar each. The first distillation of tar divides the substance into four of five fractions. The yield from one ton of Burnley tar is approximately as follows: Crude naphtha, 6½ gallons; light oil, 13 gallons; creosote, 48 gallons; 30 per cent. anthracene, 13½ lbs.; pitch, 12¾ cwt. It will be seen that the pitch forms nearly two-thirds of the whole; and as its market price has sometimes varied between 55s. and 18s. per ton in a comparatively short period—the value sometimes doubling or halving in the space of twelve months—the great variations in the price obtained for our tar can be understood. Indeed, the purchase of tar by contracts extending over a lengthened period has often been of a speculative character. This fact has led to many contracts being based on a sliding-scale. Some years ago, I recommended the adoption of this principle, and from 1903 to 1909 our tar was sold on sliding-scale contracts, each extending over three years. The contract assumed definite quantities of certain products from each ton of tar. Each month a value for the market price of the products during that month was agreed upon by two assessors (one for each party). From the sum total of the market value of the products thus ascertained, a deduction was made for transit charges, working expenses, and distillers' profits. This deduction was the figure stated in the competitive tenders; and it varied from 6s. 11d. to 7s. 6d. per ton of tar. At first sight it would appear that the element of speculation was entirely got rid of by this method of sale: but experience shows that the market price of a product often bears very little relationship to the average price then being obtained for it. The products are often sold on long contracts, and the market price only represents what can be obtained for the surplus then unsold, which may be fictitiously high or correspondingly low. From the figures given above, we may conclude that the margin between the price paid for our tar and the value of the products is about 7s. 6d. per ton; in the absence of competition it might be greater. On our annual production of 3000 tons, this amounts to £1120. The working expenses for fuel, labour, and repairs I estimate at not less than £750. The cost of the plant, including stills with preheaters, condensers, storage-tanks, steam-boiler, pumps, casks, &c., I estimate at £2000. If we allow 10 per cent. for interest and depreciation, it will be seen that there is no great margin for profit. While it is true that tar distilling is in very few hands, so that there is little competition for our contracts, I do not feel able to recommend the Committee to undertake the work at the present time. If and when the gas-works are removed to a new site having better facilities for loading on to rails, it might well be worth further consideration.

Xylene in Benzol as Motor Fuel.—"Some manufacturers of benzol," says "The Motor," "are in a hurry to make too much money out of it. In some cases the hurry is beginning to take the shape of far too large a percentage of xylene, which (at the present stage of the movement, at any rate) is by no means desirable. Twenty, and even thirty per cent., of solvent naphtha additions must cease—and cease quickly—or we shall have to speak out publicly on the subject."

Gas from Sewage "Cake."—In a paper read at the opening sessional meeting in Dublin of the Engineering and Scientific Association of Ireland, Mr. M. F. Purcell, B.L., referred to the "perfect system" of sewage utilization which had been in operation in Chorley, Lancashire, for a year. He explained that the sewage cake was put into large retorts and burnt by the combustion of its own hydrocarbons; that the products of combustion were thrown off and dealt with; and that from the cake were obtained a quantity of lubricating oil and oil for other purposes, many thousand feet of gas, and a valuable residue. It was calculated that in a city of 300,000 inhabitants the profits on such a system would reach £18,000 per annum.

CEARÁ GAS COMPANY, LIMITED.

The Annual General Meeting of this Company was held last Friday, at the London Offices, No. 9, Queen Street Place, E.C.—Mr. F. A. WALLROTH in the chair.

The SECRETARY (Mr. E. Pratt) read the notice convening the meeting and the certificate of the Auditor; and the report and accounts were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said it was difficult to compare the items in the accounts on the present occasion with those of the previous year, as the exchange had been taken at 16d., instead of as hitherto at a higher figure. Taking first the balance-sheet, on the debit side debentures were £10,000 more than last year. Sundry creditors showed an increase of £4000; while the reserve stood at the same amount. On the credit side, new works exhibited an increase of £15,000. He was glad to say the works which had been undertaken in order to carry out the alterations necessitated by the extension of the concession were now finished. The Company had not derived much benefit from them while they were being executed; but now that they were completed, it was hoped the shareholders would have their reward. The amount due for gas, meter-rentals, &c., was £2200 less; while stocks showed an increase of £1100. The item of goods in transit was £600 less, and cash and bills receivable £1400 less. Coming to the revenue account, the items were much affected by taking the exchange at 16d. There was a slight increase in the amount received for gas supplied; while products and fittings were a little less. The item of coal carbonized was more. As they all knew, the price of coal had risen, and so had freights. The item of loss by exchange, which used to figure to such a large amount, had now disappeared. The result was a profit of £5900, against £7600 for the preceding year. This difference was largely accounted for by the extra cost of repairs to public lamps and the cost of coal carbonized. The lamp repairs had cost £1000 more; but this would be a non-recurring charge. The extra cost of coal amounted to £700. The amount named, added to the balance brought forward, left a sum of £14,336 to deal with. Out of this, the Directors had transferred £4000 to the exchange equalization account. This was a precautionary measure, in case the exchange should fall below 16d. Then they proposed a dividend making 10 per cent. on the ordinary shares for the past year, and leaving £7455 to be carried forward. It would be noticed that the Directors intended to issue the balance of £10,000 in ordinary shares of £10 each. This had become necessary owing to the cost of the extensions. Not only had the prices of materials risen greatly since the alterations were first planned, but there had been an increase in freights and various charges on the other side in respect of all the materials shipped. It was proposed to issue these shares at par *pro rata* to the ordinary shareholders. The shares sold by auction last year realized from £11 to £11 10s. each; the average being about £11 5s. Thus, in issuing the new shares at £10, there might be something for the shareholders. An extraordinary meeting would be held at the close of the meeting, for the purpose of making an alteration in one of the Articles of Association. The Board found the Company hampered by there being no provision for giving any Director a reasonable remuneration if he rendered any extra service to the undertaking outside the ordinary duties of a director. At the present moment, the Board could employ any outsider, and remunerate him; but they could not do this with a member of the Board. The articles dated back to the year 1864, when companies were only just beginning to get to work; and all modern articles contained a similar clause.

Mr. F. W. BROTHERS seconded the motion.

Mr. R. M. LONG inquired why the outstanding amount on the second preference shares was not called up, instead of issuing new ordinary shares. He said that 10 per cent. was being paid on the ordinary as well as on the preference shares, so that the proposal made could not be from motives of economy. They could call up the balance outstanding on the preference shares, and issue new ordinary shares with an uncalled liability on them. It seemed unfair that the preference shares should continue to bear the burden of liability.

Mr. CHARLES WEBB said he was quite in accord with the remarks of the previous speaker, and strongly objected to further ordinary shares being issued while liability remained on the preference shares.

Mr. LONG said that in the balance-sheet the investments were taken at cost, which was considerably in excess of what they would realize to-day. He thought the depreciation should be shown.

The CHAIRMAN, in reply, said that the Board would favourably consider the proposal in regard to calling up the liability now existing on the preference shares. They would, however, in any case have to issue ordinary shares, as the outstanding amount on the preference shares would not meet their requirements. It was true that there had been depreciation in the investments; but on the other side of the balance-sheet, included in the item of sundry creditors, there had been placed the interest received on the investments. This was over £800, which was more than the depreciation on the investments.

The resolution was then carried unanimously.

On the proposition of the CHAIRMAN, seconded by Mr. T. M'MAKING, a dividend was declared for the six months of 5 per cent. on the preference shares (less income-tax) and of 7 per cent. on the ordinary shares (tax free), making, with the interim dividend already paid, 10 per cent. on the preference shares and 10 per cent. on the ordinary shares for the year.

The retiring Directors (Mr. Brothers and Mr. M'Making) and the Auditor (Mr. A. W. Cooper) were then re-elected.

The CHAIRMAN, proposing a vote of thanks to the staff in London and Ceará, said the Engineer (Mr. Reid), who was at present in London on holiday, had carried out all the alterations in the very best way. He had had trying times during the last three years; and the extra work thrown upon him and his staff had been very great.

Mr. M'MAKING seconded the vote, which was cordially passed, and acknowledged by the SECRETARY.

The Chairman and Directors were also heartily thanked, on the proposition of Mr. WEBB, seconded by Mr. LONG.

An Extraordinary General Meeting was then held, at which, on the

motion of the CHAIRMAN, seconded by Mr. BROTHERS, the following resolution was unanimously passed: "That the Articles of Association of the Company be altered by the insertion therein, immediately after Article 61, of the following article, namely:

> 61a. If any Director, being willing, be called upon to perform extra services or to make any special exertions in going or residing abroad or otherwise for any of the purposes of the Company, the Directors may remunerate the Director so doing, and such remuneration may be either in addition to or in substitution for his share in the remuneration above provided."

The SOLICITOR (Mr. Blyth) explained that the resolution would not really give the Board powers which they had not before, but it would enable them to do what was referred to in a more simple manner than hitherto.

The proceedings then terminated.

TURIN GAS COMPANY.

Annual Report.

The report of the Directors of the Turin Gas Company for the year ended the 30th of June, which was presented to the proprietors at the recent ordinary general meeting, furnished the following particulars in regard to the working of the undertaking.

The sale of gas in the twelve months amounted to 21,249,359 cubic metres, or about 750 million cubic feet; being a decrease of 187,067 cubic metres, or rather more than 6½ million cubic feet, compared with the preceding year. The Directors pointed out that this slight falling-off in the sales was not to be regarded as a check to the continued progress of the Company, but was due exclusively to the unusually large consumption of gas in the second half of the year 1911, when, owing to the approaching termination of the exhibition, and the additional work entailed in demolishing the buildings, there was extraordinary activity in city life, with a corresponding exceptional increase in the consumption of gas. This is shown by the fact of the augmentation in the number of meters in use, which from about 42,000 on June 30, 1912, rose to about 45,000 on June 30, 1913. The sales of gas were distributed as follows:

	Cubic Metres.	Percentage of Total.
Ordinary consumers	18,701,305	88·01
Industrial purposes	678,006	3·19
Aëronautics	7,200	0·03
Motive power	99,785	0·47
Public lighting	1,763,063	8·30
	21,249,359	100·00

The total amount realized from the sale of gas was 3,871,345 lire (£154,854). The losses amounted to scarcely 1·48 lire per 1000 lire to be collected—a small percentage when the great industrial crisis in Turin, owing to the war and strikes, is considered.

The constant attention given by the Company's inspectors to the distributing plant continued last year to be productive of good results; the already low proportion of unaccounted-for gas being further reduced to only 4·93 per cent. The work of taking up and relaying all the city mains, commenced during the previous year, was not only continued with assiduous care, but also carried out on a larger scale, so far as the requirements of the service and city streets would allow. It is intended to push the work forward to completion; the Directors being assured that the profits which will accrue will amply compensate them for the expenses incurred. At the same time, confident in the future of the city, they are lengthening the street mains, so as to give the benefits of their work to all sections.

In the year 1912-13, the coal market was characterized by great firmness. From 24s. 6d. per ton c.i.f. at Savona in July, 1912, prices continued to rise until they reached 29s. in the second half of November, and then slowly fell, at intervals, to 25s. in the month of June last. Considering the good results achieved during the year 1911-12, as well as in the year covered by the report, the Directors obtained their supplies by purchasing small quantities at a time as a favourable occasion presented itself; and this system was very profitable. Although the average price of coal was high during the past year, the price of gas in January, 1912, was considerably less than the conditions of the market justified; but it was unanimously decided not to make any change. During the entire year, therefore, the figure was kept at 14 c. per cubic metre (3s. 2d. per 1000 cubic feet). This was done with the object of maintaining, for the benefit of the city, a certain regularity in the selling-price of gas, and with the confident hope that, with subsequent economy in the extraordinary expenditure connected with the works, assisted by increased revenue from a larger consumption of gas and higher prices obtained for residuals, it would be possible to close the account without liabilities.

As in the past, the sale of coke proceeded last year with the greatest regularity. Owing to the general scarcity of the product, great difficulties were experienced by the Directors in supplying the Company's usual customers; but, aided by the devoted labours of the Secretary (Signor Lorenzo Giordano), they succeeded. With regard to the other products, by the treatment of ammoniacal liquor, excellent results were obtained with concentrated liquor and sulphate of ammonia, which could always be easily sold at remunerative prices. The employment of tar for road-making purposes has opened out new markets, which completely exhaust all the Company's production.

Being compelled to limit their extraordinary expenditure during the year, no improvement work worth mentioning was executed. The plant for the new ammoniacal liquor house and the third purifying house was completed, and started; and it is giving perfect satisfaction. Consequently, from the point of view of purification, the works are now well equipped. During the current year, it will be absolutely necessary to complete the retort-house plant, and replace the washers, which have lost their efficiency and are expensive to maintain.

The Directors are pleased to be able, as in the past, to speak well of the employees and workmen, all of whom, they report, displayed the greatest zeal and attention in the discharge of their duties.

In conclusion, the Directors say that for the good results obtained in the past year they have specially to thank their esteemed Manager, Sig. Cav. Rag. Giacomo Beria, who, in both the technical and administrative departments, succeeded in upholding the prestige of the Company, and keeping it in the path of progress and prosperity, in spite of the difficulties encountered.

The balance-sheet accompanying the report showed a surplus of 2451 lire, which is to be carried forward.

THE STOCKPORT GAS STRIKE.

A mass meeting of the Stockport municipal workers was held last Friday night to consider what steps should be taken regarding the alleged victimization of certain workmen—stated to be fourteen—in consequence of the recent strike at the gas-works. Some plain speaking was indulged in, and threats were made to throw the town in darkness again. Ultimately the counsel of Mr. P. J. Tevenan, the General Secretary of the Municipal Employees' Association, prevailed; and it was arranged that a deputation should meet the Emergency Committee of the Town Council on Tuesday (to-day). Our Manchester correspondent writes: The Labour-Socialist party made the most of the recent strike in the "literature" they issued for the local elections last Saturday. From the first, however, their attempt to make capital out of the trouble at the gas-works and the inconvenience of consumers was, of course, doomed to failure, and did not help them in the slightest. So far as one can gather, there appears to be no ground for the allegations which are being made of victimization; and it is thought that the majority of the men are quite satisfied with the settlement arrived at a fortnight ago. It is true that a few have not as yet been taken back; but an explanation has been given of this. Contests took place in eight wards in connection with the local elections on Saturday; the retiring members being opposed either by Labour men or the Socialists. The Labour candidates fought principally on the question of the recent gas strike, and allegations of victimization were also made. In not a single case were the Labour men successful; the retiring members being re-elected *en bloc*.

ALLOCATION OF NOTTINGHAM GAS PROFITS.

So large a measure of attention was directed during the recent municipal campaign in Nottingham to the question of the allocation of the profits on the Corporation gas undertaking, that most other matters took a subsidiary place. Some disparity in relation to figures was probably inevitable, from the conditions inseparable from electioneering pronouncements; but one at least was of such a character as to necessitate a very drastic correction from the Chairman of the Gas Committee (Alderman A. Ball). He took particular exception to a statement, for which one of the present Liberal members of the Council was responsible, that the profits last year amounted to 35 per cent.—explaining that as a fact the gross profits were £129,305, which was equivalent to 10·9 per cent., while the net profits were £72,563, representing actually a profit of 6·1 per cent. only. The correction was obviously significant; but the more important matter involved in the conflicting contentions to which prominence was given during the contests bore relation to the allocation of profits. The trend of Nottingham municipal financial arrangements in recent years has been in the direction of extracting the very last penny available from the Corporation trading concerns in relief of the district rate; and as the gas undertaking provides the lion's share in the process, during the last few days the question has again been forced to the front as to how much longer Nottingham gas consumers are in this way to be made to bear a disproportionate share of local burdens. Major Ashworth, a former Mayor of the city, who was once more a candidate for municipal honours, urged that the policy of the Committee should be towards reducing the price of gas rather than the piling-up of profits. Public feeling in Nottingham appears to be growing strongly in support of this view, particularly among the manufacturing community representing the largest consumers. But the "milking" of gas profits by both parties in the Council is apparently so much a settled policy that the remedy does not seem easily possible of speedy accomplishment.

On Friday night, the eve of the municipal polling in Nottingham, the Chairman of the Gas Committee dealt further with the subject at a meeting at which he presided in the ward in which the Woodborough Road depôt—the scene of the now happily ended labour troubles—is situated. He observed that Mr. Richards, the councillor who was responsible for the original statement that the profits on the gas undertaking amounted to 35 per cent., had since reduced the figures to 19¾ per cent. Alderman Ball added that perhaps it would need only another few days for Mr. Richards to come to the absolute bed-rock of accuracy in regard to the matter. In point of fact, the figures which he (the Chairman) had presented were obtained from the only reliable source of information—the Accountant's Department. Mr. Richards had given him credit for knowing something about gas making, but no credit for knowing anything about figures. He would, however, advise that gentleman to be careful to obtain his information from the only authoritative quarters. Much had been made during the present contests about the price charged for gas in Nottingham. For 25 years, however, the Liberal party when in power made no reduction; but during the short period the Conservatives had been in the majority the price of gas had been reduced by 2d. per 1000 cubic feet, equivalent to £13,000 per annum. Moreover, a penny in the shilling had been returned to users of prepayment meters—this being equivalent to £6500 annually, or a reduction altogether of £19,500. In addition to this, the present Gas Committee had spent much more than their predecessors upon repairs and renewals; and besides this they had built-up a substantial reserve, now amounting to £160,000. Moreover, they were paying out of revenue for the new works at Radford; and when the operations there had been completed, he believed the city would possess one of the most complete gas-works to be found in the country.

WEST BROMWICH TRADESMEN AT THE GAS-WORKS.

Visit of Inspection.

Last Wednesday, about 150 members of the West Bromwich Tradesmen's Association, accompanied by their wives, paid a visit of inspection to the gas-works, and spent a very enjoyable time there. They were received by the Mayor (Mr. J. A. Kenrick), the Chairman of the Gas Committee (Mr. J. Brockhouse), the Gas Engineer (Mr. Harold E. Copp), and members of the Gas Committee, who conducted them over the establishment. In connection with the visit, Mr. Copp had prepared a pamphlet giving some particulars of the works; and a copy was presented to each of the guests.

Mr. Copp first dealt with the railway sidings, and described the method of moving the coal-trucks on their arrival. He next passed to the retort-house, which is now approximately 230 feet long, and contains 112 twenty-feet through retorts, equal to producing 1,550,000 cubic feet of gas per day. One section of the house, containing four beds of horizontal retorts, capable of making 450,000 cubic feet per day, has been removed to afford room for the new vertical retorts, which will have a daily productive capacity of 1,250,000 cubic feet. The electric retort charging and discharging machines were shown in operation, and the plant for the removal and sorting of the coke was explained. Inspection was made of the new vertical retort installation in course of erection by the Woodall-Duckham Vertical Retort and Oven Construction Company, Limited. This plant will be capable of carbonizing 120 tons of coal per day, producing 1,250,000 cubic feet of gas. The coal will be crushed by an electrically-driven machine, and conveyed by means of a Babcock and Wilcox gravity bucket conveyor to storage hoppers at the top of the building. The same conveyor, when reversed, will serve to remove the coke discharged at the bottom. This operation will be controlled by means of gearing driven by two 3½-H.P. gas-engines. In the cellars of the retort-house are one 16-B.H.P. gas-engine, one 20-H.P. steam-engine for driving the elevators, and one 6-B.H.P. gas-engine, coupled to a dynamo, for generating current at 115 volts for lighting certain portions of the works. On the siding is another engine-house containing a 16-B.H.P. gas-engine for driving the coke-machine.

There are three exhausters—two being horizontal reciprocating machines, and one a rotary machine capable of dealing with 120,000 cubic feet of gas per hour. Mr. Copp explained that from the exhausters the gas passes through the Livesey tar-extractor, thence through a naphthalene extractor to the cyanide washer, afterwards through an ammonia washer to the final washer for the removal of the last traces of ammonia, and then to the purifiers. After leaving these, it goes through the station meters, each of which is capable of registering 60,000 cubic feet of gas per hour, and then into the holders.

The party inspected the water-gas and coal-testing plants, and then proceeded to the laboratories, where they were shown the methods of testing and analyzing the gas, raw materials, and residual products.

At the close of the inspection, the visitors had tea in the meter-house, on the invitation of the Chairman of the Gas Committee.

The Mayor, before the gathering separated, proposed a hearty vote of thanks to the Chairman of the Gas Committee for his hospitality. He said he hoped that the visit would result in the consumption of more gas in future; for the more gas burnt the cheaper would be the rate at which the consumers would be likely to get it. If they would bear this in mind, they would help the Chairman and the Gas Committee to make the undertaking a prosperous one.

The proposition was enthusiastically carried.

Mr. Brockhouse, in returning thanks, said it afforded him very great pleasure to be present with the Mayor and Mr. Copp to receive the tradesmen of West Bromwich. He felt sure their visit would act as a stimulus to the Committee to do all they possibly could to make the gas undertaking a thorough success. He impressed upon the visitors the fact that they had large gas-works, and that the Committee were able to double their output, which would mean that they would be in a position to sell gas more cheaply than was done at the present time. He was delighted that the tradesmen of West Bromwich were interested in the gas undertaking, and anxious to know what they really possessed. It was his hope that the public, who were the shareholders, would, in future, do all they could for the directors, who were the Gas Committee, to make the concern a great success.

Mr. S. Darlington (the Chairman of the Tradesmen's Association) proposed a vote of thanks to the Mayor. He also expressed to Mr. Copp the Association's high appreciation of his services, and assured him that his explanations of the manufacture of gas had been most interesting to the visitors.

The vote of thanks having been unanimously accorded,

The Mayor replied, and spoke in appreciative terms of the efforts of Mr. Brockhouse and Mr. Copp to render the visit a success.

Mr. Copp, in response to a demand from the visitors, briefly returned thanks.

The visit closed with three hearty cheers for Mr. Brockhouse.

Southampton Gas Company.—The report of the Directors of this Company for the half year ended the 30th of June sets forth that after payment of the debenture interest and other charges, the profit and loss account shows a balance of £17,843 available for distribution; and the Directors recommend that the maximum dividend of 5 per cent, amounting to £15,468 for the half year, shall be paid (less income-tax), leaving a balance of £2375 to be carried forward. There was a further development of the Company's business in the half year. The work of erecting the new retort-house has shown good progress; and it is hoped that the whole of the new plant will be brought into operation by the end of the present month.

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THE NEW VERTICAL RETORTS AT NOTTINGHAM.

After having been postponed to a later period than was originally contemplated, in consequence of unexpected engineering difficulties which were encountered upon the site, and the failure, owing to labour troubles, to obtain necessary materials by the time stipulated, further delay has now been entailed in connection with the inauguration of the new installation of Glover-West vertical retorts at the Radford Gas-Works of the Nottingham Corporation. The opening had been fixed for Friday last, for which day the Chairman of the Gas Committee and his colleagues had invited other members of the Corporation to meet them at the works, and subsequently to attend a luncheon at the Exchange Hall. But official notices were sent out by the Town Clerk earlier in the week, stating that, upon an inspection of the works by the Committee on Monday, it had been found "that the installation was not sufficiently advanced for inspection by the Council at present." The opening ceremony and luncheon were therefore further postponed.

Although the official inauguration of the works has been delayed, no necessity was entailed for a postponement of the utilization of a portion of the new plant. Consequently, two of the beds of retorts were set in operation on Friday—one of them being charged by Alderman Ball, and the other by the Vice-Chairman of the Gas Committee (Alderman J. P. Ford); Mr. John Wilkinson, the Corporation Gas Engineer, being also present at the informal ceremony, together with representatives of the contractors. It is interesting to recall that Alderman Ford, who is the *doyen* of the Corporation, was the first to set in operation, many years ago, at the Barford station, the compressed air retort-stoking machinery, which was also installed by West's Gas Improvement Company, Limited. It is anticipated that not more than four or five weeks will elapse before the members of the Council will have the opportunity of participating in the opening of the finished undertaking; certain essential details in relation to which will, it is expected, have then been entirely completed.

LANCASTER CORPORATION GAS UNDERTAKING.

Proposed Management Changes.

At the Meeting of the Lancaster Town Council last Wednesday, important proposals in connection with the management of the gas-works were submitted by the Chairman of the Gas Committee (Sir Norval Helme, M.P.). They were that Mr. Charles Armitage, who has been Engineer and Manager of the works for 34 years, should be appointed Consulting Engineer, and that Mr. Cecil Rhodes Armitage, at present Engineer and Manager of the Morecambe Gas-Works, should be engaged as his successor. Speaking in support of the proposal, Sir Norval said Mr. Armitage had felt that he must ask for some relief in the management of the works; and if the Corporation appointed him Consulting Engineer, he would be ready at all times to give them the benefit of his advice. He was appointed Manager on Dec. 28, 1881, and since then the quantity of gas manufactured had increased from 51½ to 221 million cubic feet per annum, and the sum of £53,492 had been contributed in relief of the rates. The proposal was that Mr. Armitage should become Consulting Engineer from the 31st of January next, when he would have completed 34 years' service. The Council would see, from the minutes, that the gas undertaking had arrived at the position of being the premier one in the country in regard to the net cost of gas per 1000 cubic feet. With regard to Mr. C. R. Armitage, on leaving school he was for some time with his father, and then served his articles at the Nottingham Gas-Works, and qualified in chemistry, engineering, and gas manufacture at the Nottingham University. He was appointed Assistant to the Engineer of the Nottingham Gas-Works, and was afterwards Assistant-Manager of the Preston Gas-Works. In May, 1909, he obtained the position of Manager of the gas-works at Morecambe, and he had turned a concern worked at a deficit into one which was profit-producing, and at the same time had effected a reduction of 4d. per 1000 cubic feet in the cost of gas. Sir Norval concluded by remarking that both the public and the financial interests of the town would be served by adopting the Committee's recommendations. Mr. W. Briggs (the Mayor-Elect) seconded the motion. In the course of the discussion, very warm tributes were paid to Mr. Armitage for the services he had rendered during his long connection with the gas undertaking; but the Council felt that there was a certain amount of vagueness about the proposals as submitted, and it was decided that they should go back to the Committee.

BRADFORD AND MUNICIPAL COAL SUPPLY.

One of the matters considered at the last meeting of the Bradford City Council was the advisability of purchasing a quantity of coal for sale to householders.

Mr. BROWN moved a resolution instructing the Gas Committee to expend out of the trading profits of the gas undertaking which are legally applicable for the purpose a sum of £5000 as a fund for the purchase of coal such as is usually consumed in working-class dwellings; the coal to be resold, upon the terms of cash on delivery, by the Committee, in quantities of 1 cwt. and upwards, to householders (exclusive of dealers) at such prices as will represent the cost of the same and the expenses of handling and administration, together with interest on the capital sum of £5000 at the current rate. He urged that the hardship involved by the high prices of coal was even greater now than it was a year ago. Since the summer of 1911, there had been an advance in the price of 3s. per ton. Moreover, in Bradford the merchants had generally maintained the winter prices during the summer,

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though practically all the collieries who put on 1s. a ton in October took it off again in April. His object was that between the pit and the householder there should be no middle man, but only the Bradford Corporation. He asked the Council to take precautions so that such a state of things as prevailed towards the close of 1911, when coal of inferior quality was sold at 3s. 6d. per bag, could never arise again. He contended that the Corporation could sell coal cheaper than the ordinary merchant. In the first place, the Corporation had at their gas-works both sidings and storage accommodation, and would not have to pay the railway company for such services. Besides, as it would not be the purpose of the Corporation to make profits, they could sell the cheaper.

Mr. PRIESTLEY remarked that reference had already been made to the fact that the October meeting was usually an electioneering meeting. This to some extent accounted for the resolution. About twelve months ago they were advised that, in the interest of the Corporation, they should acquire a coalfield or a coalpit; but it did not take the Council long after passing the resolution to see the folly of what they had done, and the resolution was hastily rescinded. The proposition to his mind was a most delusive one, opposed both to facts and experience. If the Council could not buy for less than other people—and he did not think they could—then they could not use the economic weapon to which reference had been made. The Corporation's money was no better than that of other people. There was no doubt that the price of coal had gone up seriously; and if the Corporation could do anything to arrest the advance in price, they ought to do it. But a good many things besides coal had gone up, and they were powerless to arrest the advance; it was a question of supply and demand. All the facts went to show that the Corporation could not do better than a co-operative society.

Mr. SMITH said he had repeatedly supported such resolutions; and until there was a complete change in the methods of the coal trade, he should continue to do so. He was certain that Mr. Priestley was wrong in saying the Corporation could not buy for less than other people. The law of supply and demand did not regulate these things. This law had not regulated the coal trade for years; for the trade to all intents and purposes was "ringed." It was the duty of the Corporation to make experiments in the interest of the public.

Mr. PARKER said his view was that, where private enterprise failed, it was the duty of the municipality to step in. He reminded the Council that, when they took over the tramway and gas undertakings, they bought out the old companies; but they were not pretending to buy out the coal merchants. They were proposing to cut them out without consideration. He did not think the public wanted this.

Mr. STAMFORD supported the resolution, saying that he suspected the real fear of the opposition was not that the ratepayers would suffer, but that the experiment would be a success.

Mr. MITCHELL spoke strongly against the resolution, remarking that Mr. Brown had shifted his ground very considerably since last year in regard to this question.

The resolution was defeated by 31 votes to 10.

MODERN ARTIFICIAL LIGHTING.

Lecture by Mr. A. Docking.

In the course of a lecture on "Modern Artificial Lighting" delivered before the Belfast Citizens' Association by Mr. A. DOCKING, of Manchester, he said a business man was by no means behind the times if he used gas for lighting. Referring to the cartoon in "Punch" showing the lamp-posts in the City of London twisted and broken down, while the elecric arc lamp was represented as the rising sun above the horizon, he said a picture showing exactly the opposite would be more appropriate now, for within the last few years no fewer than from 3000 to 4000 electric arc lamps had been replaced by modern high-pressure gas-lamps, and thousands of shops and business establishments had followed suit. This applied also to provincial cities, where high-pressure gas installations were being increased by thousands every year. The reason the tide had turned in favour of gas was that gas lighting, on modern principles, was found to be better for street lighting because of its greater diffusing and penetrating rays, and for factory and domestic lighting because the light was softer and not nearly so trying to the eyes as the electric metallic-filament lamp. This was quite apart from the cost, which was decidedly in favour of gas. He took a basis of 1000 metallic-filament lamps of 75-candle power each, and 1000 high-pressure gas-lamps of the same power, and held that, on actual makers' estimates, even if current were generated for nothing, there was a balance of more than £100 per annum in favour of gas.

In a number of comparisons dealing with domestic and industrial lighting, Mr. Docking took the conditions existing in Belfast—gas at 1s. 9½d. per 1000 cubic feet net, and current at 3½d. per Board of Trade unit—and said that, generally speaking, light for light, electricity was from eight to nine times dearer than gas. As to the relative merits of the two systems for cooking purposes, there was an amount in favour of gas; and gas was of greater reliability at all times and in all conditions. In this connection, the lecturer pointed to the untrustworthiness of electric lighting in theatres and similar places, and to the fact that a standing system or an independent cable from another works had to be provided—thus increasing the cost. Mr. Docking also dwelt on the hygienic aspects of the two systems and the relative dangers from fire. With reference to the Aisgill railway disaster, he said that, until he had further proof that gas was dangerous for use in railway trains, he would continue to favour it. Gas was quite as safe as electricity. Rarely, he concluded, had any combination of enterprise and invention borne more or better fruit for the benefit of the civilized world than the gas industry.

Mr. W. J. GILLILAND, in the discussion which followed the lecture, expressed the opinion that for cheapness of illumination gas held the field. In Belfast, he said, 90 per cent. of the gas-piping and gas-fittings were leaking. Twenty-five years ago, gas-fittings were made

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are the very class who can afford to pay big gas bills
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is seen to be very strong."

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by one firm in a proper way; but they were crushed out of the trade by those who turned out an inferior article.

Mr. DOCKING, in reply, said he considered that all internal gas-fittings ought to be under Corporation control. In Belfast and other towns under municipal government they had no supervision of gas whatever, with the result that the plumber, owing to competition and the cutting of prices, was unable to do the work efficiently. Municipalities, therefore, ought to have the supervision of fittings.

GAS MATTERS AT SCOTTISH MUNICIPAL ELECTIONS.

In view of the approach of the municipal elections, gas has been figuring largely at many of the ward meetings throughout Scotland, notably at Kirkcaldy, Lanark, and Hamilton. At the former place, the question of the removal of the works to a new site, or the extension of the present works, has become an important one, as, if the foreshore is to be improved, as is proposed, the present site would be right in the middle of the promenade. There is also the matter of the cartage and disposal of rubbish from the existing works, which are not near the railway. It has been pointed out that new works frequently mean cheaper working and a reduced price for gas. The recent rise of 2d. per 1000 cubic feet is rankling in the minds of the electors. At Lanark, the borrowing of money to pay for the recently acquired gas-works, at 5 per cent. interest, has been frequently spoken of; but it has been pointed out that this was only to be in force for two months, and was for immediate cash to complete the purchase. No figures were, however, stated as to the interest to be paid in future; but the reply was "Wait and see." At Hamilton, the principal point referred to was the amount of the contribution made to the rates from the Gas Department. It seems that several years ago a compromise was come to between two parties in the Council to the effect that while the gas was to be kept as near cost price as possible, the profit upon sulphate of ammonia was to be handed over annually for the reduction of the rates. In the present year this has amounted to £2000. The trouble just now is that, owing to the rise in the price of coal, the estimates look like showing a deficit instead of a profit; and some are thinking that the profit from the sulphate plant will have to be used to make good the deficit. One councillor tried to show that the reduction of the rates was more remunerative to both large and small consumers than cheap gas. Inverkeithing is discussing the purchase of the gas-works, the Council having decided to adopt the Burghs Gas Supply Act; and speakers are agreed that this would be for the good of the community. The Denny councillors are priding themselves on their extension policy; having added some 200 consumers during the year, which necessitated the making of 5 million cubic feet more gas, while at the same time the price has been reduced by 5d. per 1000 cubic feet. Dumfries hecklers have been complaining of the street lighting, and they want the lamps lighted earlier and put out later. They complain that the Lighting Committee used to inspect the lamps in the daytime. At Falkirk, questions have been asked as to the sum a would-be councillor will be prepared to pay to Mr. M'Kee for the work he did in connection with the underpinning of the gas-works. Mr. Lee, at Dunfermline, claimed that the purchase of the gas-works was a huge success, as they had at present the third cheapest gas in Scotland.

AN EARLY GAS EXPLOSION IN LONDON.

Explanatory Statement by the Gaslight and Coke Company.

"The Times" for last Wednesday contained the following statement by the Governor and Directors of the Gaslight and Coke Company in regard to an explosion which had occurred, and presumably had been attributed to the bursting of a gas-pipe. It is dated Oct. 27, 1813, bears the signatures of Mr. J. L. Grant, the Governor, and Messrs. W. Pawton, Frederick Accum, John Warren, and F. A. Winsor, Directors, and was issued from the Company's office in Pall Mall.

Several exaggerated reports having found their way into circulation, the Directors of the Gaslight and Coke Company think it their duty to inform the subscribers to the undertaking, and the public at large, that the accident which happened did not originate in consequence of the bursting of any pipe, or of any proceeding connected with the regular or intended application of gas lights, the perfect safety of which has been established by the testimony of Sir Humphry Davy, and by the concurrent testimony of Messrs. Bolton and Watt, and Mr. Accum, before the Houses of Lords and Commons. Although an explosion did take place in one of their small vessels; yet no material injury was done to the works, nor was any individual injured thereby, except the engineer, who was slightly hurt. The occurrence, so far from offering any grounds for apprehension as to the ultimate prosperity of the gaslight system, affords testimony to establish the perfect safety of the machinery which is requisite for the gaslight application; and they who are in any way familiar with the nature and principles of the subject on which the system is founded will readily allow that the bursting of pipes can never take place, because explosion must always be confined to the machinery itself. A clear and satisfactory statement of the accident and its cause, and the reason why its occurrence will not, in the most remote degree, militate against the gaslight system or retard its prosperity, is to be presented to a general meeting of the Corporation, and afterwards published for general information.

It will be seen, from an announcement which appears elsewhere, that the Bournemouth Gas and Water Company are inviting tenders for an issue of £25,000 of 4 per cent. perpetual debenture stock, at a minimum price of £95 per £100 of stock. This is a new issue under the powers obtained by the Company last session.

Gasfire.

ated with Art as is the Richmond "PERIOD" of present day furnishing and decoration. The by Gas Undertakings throughout the country is Gas Undertakings as follows:—

by the best class consumer was prevented from years owing to the wretched design of Gasfires at person who placed æsthetics before consideration of able to put before such people—and they are steadily the demand of æsthetics, but also that of economy and of consumers to whom well-designed Gasfires appeal for heating . . . and never grumble at the bills case for Gasfires similar to your 'PERIOD' Series

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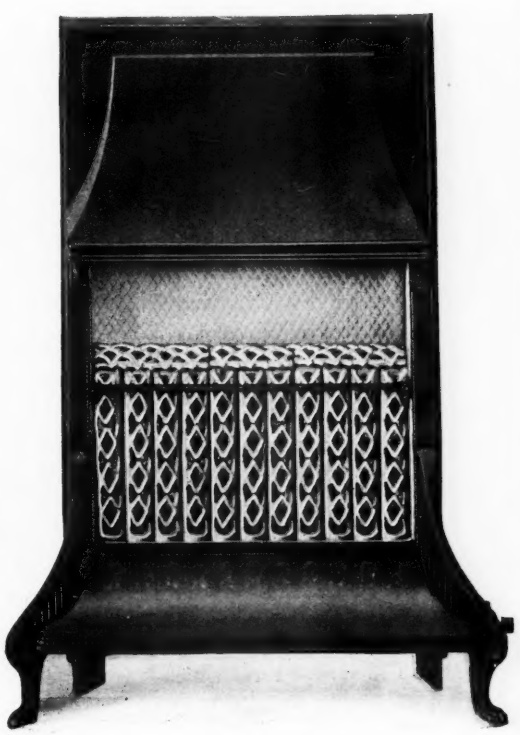

The "LOUIS."

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, E.C., last Tuesday, Messrs. A. & W. Richards offered for sale stocks and shares in several gas companies. The first lots consisted of consolidated stock and 4 per cent. perpetual debenture stock of the Uxbridge Gas Company—these being new issues by order of the Directors. The former ranks for a standard dividend of 5 per cent., subject to the sliding-scale; and existing similar stock has for the two years ended the 31st of December last received dividends of £6 2s. 6d. per cent. per annum. It fetched £116 5s. to £118 per £100; and the debenture stock realized £93 per £100. A parcel of consolidated ordinary 5 per cent. stock of the Lea Bridge District Gas Company, the last dividend on which was at the rate of 6¼ per cent. per annum, realized £125 per £100. Under instructions from executors, a few fully-paid £5 shares in the Colonial Gas Association, Limited (last dividend 6 per cent. per annum, free of tax), were submitted for competition, and were disposed of at from £5 to £5 2s. 6d. each. Under similar instructions, a few £10 fully-paid original 10 per cent. shares in the Crediton Gas Company (last dividend 7½ per cent.) were sold for £11 15s. apiece. Some £10 fully-paid 6 per cent. preference shares in the United District Gas Company were placed at par—the purchasers taking the dividend accruing from the 1st of July last. The final lots consisted of £1 fully-paid 5 per cent. cumulative preference shares in the Saxmundham Gas Company, Limited; and they were sold at 17s. 6d. each *cum div.* as from July 1 last.

At the Grand Hotel, Birmingham, last Thursday, Messrs. Edwards, Son, and Figwood sold by auction, in accordance with the announcement which appeared in the "JOURNAL," £10,000 of 5 per cent. preference stock of the Redditch Gas Company, in 80 lots of £100 each and 40 lots of £50 each. Of the £100 stock, there were 7 purchasers at a premium of £2 7s. 6d., 42 at £2 5s., 15 at £2 2s. 6d., 15 at £2, and one at £1 15s. The £50 stock was mostly bought at the rate of 45s. per cent. premium, though in a few cases there were purchases at the rate of 47s. 6d. per cent.

At the Imperial Hotel, Sidmouth, last Thursday, Messrs. Crews and Son sold, by order of executors, £1000 of consolidated ordinary stock of the Exmouth Gas Company, and some 5 per cent. preference shares (£5) in the Budleigh Salterton Gas Company—the former with ten months' accrued interest, and the latter with six months' interest due on the 1st of January next. The ordinary stock sold at £53 to £54 per £50 lot; and the preference shares at £53 10s. and £54 per £50 lot.

Fire at Electrical Works in Vienna.—According to a telegram sent from Vienna last Friday through Reuter's Agency, a serious fire broke out on the previous afternoon in the central station of the General Austrian Electrical Company, and caused damage estimated at upwards of £50,000. The electric light failed in numerous business houses, and caused great inconvenience.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

The principles enunciated by Mr. James B. Stewart, at the Western Scottish Juniors' meeting, are no doubt sound from the point of view of equity to all consumers, as free cookers, free maintenance, &c., can, as he states, only be supplied at the expense of the consumer who has not, or does not require, these useful articles. On the other hand, there are several points in favour of the system. The greater quantity of gas thus used brings the price of the whole supply lower, and all consumers benefit. Again, if these appliances are only to be had on payment of their full price, the consumers simply will not get them, and the increased make of gas is not required. A small rent, of course, would meet all Mr. Stewart's objections, but the number of gas-cookers fitted would not be nearly so great in consequence. The second part of the paper deals with the staffing of the outdoor departments; and here he is very sound. The suggested booklets for inspectors and others are distinctly good, and the idea might be enlarged and made useful to all servants of a gas company or corporation, so that they might intelligently answer any consumer. Specialization, he thinks, is the key-note of success. As regards the employer, certainly it is; but for the workman it leads into narrow grooves and stunts the expansion of his mind. As regards the training of the apprentice, the system followed in Edinburgh is perhaps as good as any. In the first year, he attends continuation classes in arithmetic, physics, geometry, drawing (freehand and scale), and workshop practice in piping under the guidance of the plumbing teacher—in all, three nights a week. In the second year, mathematics, physics, drawing (one night), second course in plumbing workshop (one night), and gas lighting and appliances lectures (one night), all at continuation classes. In the third year, physics in plumbing and gas-fitting at Heriot-Watt Technical College laboratories, second course in gas lighting and appliances at continuation classes. In the fourth year, lectures on gas supply, and on applied physics and gas-fitting, both at Heriot-Watt College. These courses are all over and above the training that the lad receives in going round with a tradesman during the day. Thus the apprentice is gradually trained to have sufficient knowledge to enter a technical college, and is well grounded in first principles, so that he can understand the many physical facts which are required to repair and fix and explain the modern appliances used by gas consumers, and in time he may be able also to instruct the consumer, and even to educate him.

In connection with the Electrical Exhibition at Glasgow, some remarks by a special correspondent of a Glasgow paper regarding electricity in daily life call for comment. To the first statement no gas man will object—namely: "That no degree of finality has yet been reached in the use of electricity for heating and cooking may be inferred from the fact that the Corporation Electricity Department is not yet prepared to hire out heating or cooking apparatus." Is not this a sufficient warning to the private householder that the apparatus,

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18th Sept., 1913.

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GENTLEMEN—I have tested the two Gas Fires you have submitted, and I have obtained the following comparative results:

Your 1912 Fire fitted with fuel of that date gave 51·0 radiation. The same fire fitted with your 1913 Fuel gave 59·7 radiation. Your 1913 Fire fitted with your 1913 Fuel gave **73·1** radiation.—Yours faithfully.

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Progress in Percentages.

			Radiation Result.	Ratio.	Gain.
1912 Fire with	1912 Fuel	. . . .	51·0	100	—
1912 „	„ 1913 Fuel	. . . .	59·7	117	17
1913 „	„ 1913 Fuel	. . . .	**73·1**	143	43

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of which so much is made in the article, is not yet in a condition to stand the ordinary wear and tear of every-day use? If the Corporation Electricity Department could find a cooking or heating stove which it would be profitable for them to hire out, is it not certain that they would at once try to get to grips with the Gas Department, and follow their lead for extending their business? The claim of the electricians that their incandescent lamps give off practically no heat is quite forgotten when they suggest that this incandescent lamp should be used to give out radiant heat to warm a room. One is prepared to agree with the older statement, that little or no heat is given out by these lamps, especially when one has sat and shivered in a room which was supposed to have been heated by this means. The alternative method advised is the passing of air over electrically-heated coils, when, of course, convected currents only are obtained, whereby the air only is heated, and the walls and furniture are cold. There is also the further trouble of the lack of moisture in the heated air, about which so much complaint was made with the older type of gas-fire. It is confidently stated, in the article referred to, that as coal gets scarcer so the electric forms of heating and cooking will come into vogue. One wonders where the power is to come from for providing the electricity, when coal gets scarce. The electrical cooker is claimed to give greater exactness in the regulation of heating than the cooker heated by gas. With the electrical cooker there is not nearly the same range of temperatures as with the gas cooker, as it can only be adjusted to certain fixed amounts of heating, while the gas tap or lever allows of exact regulation. Where, however, such an expensive method as the electric is adopted for heating an oven, it has been found necessary to fit a thermometer to indicate the temperature inside the oven. This has now been done with gas-cookers also; and an excellent little thermometer for placing in ovens when the fixed heating indicator is not installed was shown at the Edinburgh Gas Exhibition. The use of this with gas-cookers would lead to economy, which would be for the ultimate benefit of the industry. The usual claims for the saving in loss of weight by electric cooking were made, though how there can be any difference when the joint is properly cooked it is impossible to understand. The fallacy of this claim has been frequently proved, though proofs, when they do not aid the electricians' claim, are usually ignored by them.

A lady candidate for municipal honours in Leith has been advocating, besides a municipal cooking depôt, that the price of gas for cooking should be charged at the same rate as that for driving power. Numbers of women had installed gas-cookers in their homes, and, as the cooker was what she would call the women's machine, she thought the gas for driving it should be charged at the same rate as that which was charged to factories and works of all kinds. If gas was provided at a cheaper rate for this purpose, many women would take advantage of that method of cooking, and would probably not only use it for cooking, but also to warm their houses.

A case of considerable interest to the gas profession has just been argued before the Sheriff in Ayr, when a stoker was charged with having, on various days during September, while engaged as a stoker in the Ayr Gas-Works, wilfully broken his contract of service by absenting himself from his work without notice. The charge was brought under the Conspiracy and Protection of Property Act. It seems that, when the Gas Manager employed this stoker, he explained to him the provisions of the Act, and drew his attention to a large poster fixed up in the works, which explained the position. The stoker, however, failed to come to work on Sept. 13, and, in consequence, to keep up the supply of gas to the town, and special efforts had to be made. When he returned to work he was cautioned by the Manager, and his position again pointed out to him; but despite this he again absented himself on four other days. The Sheriff imposed a fine of 20s. with the option of seven days' imprisonment. This decision is one which will be of great interest, especially to managers of small gas-works, as the absence of a single stoker in such works means a very large proportion of the total labour, and consequently adds greatly to the worries and troubles of the manager. If, however, he can call attention to this decision, it will give him greater confidence, and will bring home to the workmen the necessity of regular attendance at their work.

It was reported at a meeting of the Edinburgh and Leith Corporations' Gas Commissioners held last Monday that the gas made during the month of September was 148,238,000 cubic feet, as compared with 140,332,000 cubic feet in the corresponding month last year. The gas made for the year to date represents an increase of 4·69 per cent. On the motion of Provost Malcolm Smith, a hearty vote of thanks was accorded to Lord Provost Inches for his conduct in the chair during the past year; also to Bailies Lindsay and M'Michael, for their services as Conveners of the Works Committee and the Law and Finance Committee respectively. The remark was made by Provost Smith that the undertaking was never in such a healthy condition as it was at the present time; and this was largely due to the efforts of these gentlemen. In the course of his reply, Bailie Lindsay said that, unfortunately, they were loaded with on-cost charges to the extent of 1s. 2d. per 1000 cubic feet before they commenced to manufacture gas. He thought if this was remembered, there would be fewer questions put to municipal candidates as to why they could not reduce the price of gas below 2s. 8d. per 1000 cubic feet.

Cost of Gas in Lurgan.—A letter from the Lurgan Gas Company to the Urban District Council, asking for payment of an account due since May last, was considered by the Council at a recent meeting. In the course of the discussion, the Clerk said the cost of gas last season was £364, compared with £298 for the previous year and £268 for the year 1911; but the maintenance of lamps last season was only £48, against £105 in the previous year—the saving being effected by the introduction of self-lighting burners. The entire cost last year was £413, compared with £394 for the preceding year. When the account was first presented, the Council thought it was excessive, in view of the saving of more than £50 by the automatic lighting system. It was decided to appoint a Special Committee to interview the Gas Manager as to the reason for the increase in cost.

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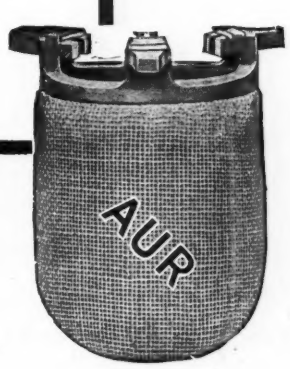

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CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Nov.* 1.

Throughout the week business in this material has been of a somewhat desultory character; both buyers and sellers having appeared rather indifferent about trading. Consequently, there have been hardly any fluctuations in prices, and the quotations at the close are £13 to £13 1s. 3d. per ton f.o.b. Hull and Liverpool, and £13 2s. 6d. per ton f.o.b. Leith. With regard to future delivery, it is reported that there are second-hand sellers for November-December shipment at about prompt values, and for the early months of next year at 2s. 6d. per ton more money. Manufacturers, however, are considerably higher in their views.

Nitrate of Soda.

This market is still very quiet, but holders on spot maintain values at 10s. 7½d. per cwt. for ordinary quality, and at 10s. 10½d. for refined.

Tar Products. LONDON, *Nov.* 3.

The markets for tar products have remained about the same during the past week. In pitch, there has been little doing; and although prices are not actually written lower, yet business is heard of as having been taken for delivery even up to the end of next year at figures which work out at under to-day's quotations. Benzol, 90 per cent., is very firm for this year's delivery; but for next year, business cannot be arranged unless some reduction is made by the sellers. Solvent and heavy naphthas remain very quiet, and contracts are difficult to arrange in either. There is little or no business doing in crude carbolic, the market for which seems to have gone all to pieces. Creosote is still firm, and good business is reported.

The average prices during the week were: Tar, 28s. 6d. to 32s. 6d. Pitch, London, 42s. to 43s.; east coast, 42s. to 42s. 6d.; west coast, Manchester, 41s. 6d. to 42s.; Liverpool, 42s. to 42s. 6d.; Clyde, 43s. to 43s. 6d. Benzol, 90 per cent., naked, London, 1s. 1d. to 1s. 1½d.; North, 1s.; 50-90 per cent., naked, London, 1s.; North, 11d. Toluol, naked, London, 10½d. to 11d.; North, 10½d. to 11d. Crude naphtha, in bulk, London, 5½d. to 5½d.; North, 5d. to 5¼d. Solvent naphtha, naked, London, 10¼d. to 10¾d.; North, 9¼d. to 9⅝d. f.o.b. Heavy naphtha, naked, London, 10d. to 10⅜d. f.o.b.; North, 9d. to 9⅜d. f.o.b. Creosote, in bulk, London, 3⅜d. to 3½d.; North, 3d. to 3⅛d. Heavy oils, in bulk, London, 3⅜d. to 3⅝d. Carbolic acid, casks included, 60 per cent., prompt, east and west coasts, 1s. 1d. to 1s. 1⅛d. Naphthalene, £4 10s. to £8 10s.; salts, 50s. to 55s., bags included. Anthracene, "A" quality, 1⅛d. to 1¼d. per unit; "B" quality, nominally ¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market appears to have somewhat steadied itself during the past week, though there has been practically no business doing. Some makers report having received better bids; but probably these have been made with the idea of steadying the market, as buyers abroad are not paying anything above to-day's quotations. Outside London makes are quoted at £12 5s. to £12 6s. 3d.; Hull, £12 18s. 9d. to £13; Leith, £13 2s. 6d.; Liverpool, £13 1s. 3d. to £13 2s. 6d; Middlesbrough, £13.

"Tar Distiller" writes under date of the 1st inst.: The tar products market is in a very similar position to last week. It would be safe to say that carbolic, at any rate, is being firmly dealt with by the makers; and while buyers are not offering any advance on last quotations, they are finding it difficult to purchase on their present basis—the article not being worth making from a profit point of view at the prices at present being offered. There is also a large amount of creosote on offer in various quarters. Pitch is just in the same position as a week ago, distillers showing a firm attitude; being well sold in many cases for a sufficient period to make them cautious in entertaining a drop in prices for which there is no justification. Benzol is still in good demand; and the increase in quantities can be marketed at home, providing the coke-oven manufacturers are willing to allow the refiner and distributer a margin of profit. The conference with the German representative intimated a basis on which this could be dealt with. Light oil and crude naphtha are ruling at prices corresponding with the prices of refined products.

COAL TRADE REPORTS.

Northern Coal Trade.

The quietness in some of the branches of the coal trade continues; but there are shipments that are up to the average. In the steam coal trade, the price of best Northumbrians may be put as about 14s. 6d. per ton f.o.b. for early loading, and second-class steams about 12s. 3d. per ton. Steam smalls are more plentiful at some of the collieries; and they vary from 6s. 9d. to 8s. 9d. per ton f.o.b. There are some additional inquiries for steam coal for Sweden for winter delivery, which may steady the market forward. In the gas coal trade, the demand is very good, both for home and foreign use, and the large output is well taken up. Best Durham gas coals are from 15s. 2d. to 15s. 4½d. per ton f.o.b.; second-class gas coals are from 13s. 9d. to 14s. per ton; and "Wear specials" are about 15s. 6d. to 15s. 9d. per ton f.o.b. Much coal is being delivered on contract at lower prices; and the forward values are also less than the current prices just given. One of the Italian gas companies, to whom tenders for 20,000 tons of coal were sent in, has decided to buy only one-fourth of this quantity at present—a significant indication of the expectations of consumers as to the future values. Gas coke is firm, with a steady inquiry; and for good qualities, the price is from 17s. 3d. to 17s. 9d. per ton f.o.b. in the Tyne.

Belfast Water Undertaking.

At a recent meeting of the Belfast City and District Water Commissioners, Mr. J. Courtney, the Chairman of the Finance Committee, in moving the resolution striking the rates for the ensuing year, said the domestic and public rate of 16d. and 4d. in the pound respectively were the same as they had been for a number of years, and, according to the estimate, would produce £62,750, which would be about £200 less than the amount received in 1912; the deficiency being accounted for by reductions in valuations on appeal, and owing to fewer new houses being erected. The sale of water by meter was expected to produce £36,029; special supplies, £7000; rent of meters, £1150; street watering, £1350; water for shipping, £2900; sale of grass and hay, £3000; and a number of small items, £499—making a total estimated revenue of £114,678. As to the expenditure, interest on mortgages and dividends on stock would absorb £62,661, or only £344 more than last year; and payments to the sinking funds, £19,637, or an increase of £10,309, due to the resumption of payments on the loans raised for the Mourne and other works, suspended for a term which ended with the present year. Deducting these two items from the total estimated revenue, there was left a balance of £32,380, which was the estimated cost of maintaining the undertaking generally.

Hinckley Gas Undertaking.

Interesting statistics respecting the progress of the gas undertaking of the Hinckley Urban District Council were given by Mr. W. H. Bott, the Chairman of the Gas Committee, at the opening of a gas exhibition in the Drill Hall, Hinckley, on the evening of the 25th ult. He said the works were purchased by the Council 32 years ago, at a cost of £35,000, and something like £38,000 had since been spent in improving them so as to keep pace with the increased consumption. To-day the Council only owed £29,000 on the works, and something like £7000 had been transferred from the profits in relief of the rates. When the works were purchased, the price of gas was 4s. 4d. per 1000 cubic feet; now it was 2s. 6d. for lighting, 2s. for heating, and 1s. 7d. for power. Again, in 1881 the number of meters in use was 573; now it is 3179, in addition to 1600 cookers. Mr. Bott said he hoped the time was not far distant when there would be as many gas-fires. With a view to encouraging the installation of gas-stoves, the Council were offering gas for heating at 2s. per 1000 cubic feet; and arrangements had been made for supplying gas-fires on hire-purchase at very favourable rates. The Council considered that the works and plant were now worth £100,000—equal to the total indebtedness of the town. Reference was also made to the excellent supervision of the works by Mr. Fred Lee, the Engineer and Manager; the undertaking having progressed to a remarkable extent during his fifteen years' connection with it. Seconding a vote of thanks, Mr. Watson, the representative of John Wright and Co., said he only knew of one town in the country that could compare with Hinckley in the price of its gas for heating; and the population there was four times as large as at Hinckley.

Gas and Electricity Show-Rooms for Burton-on-Trent.

Last Thursday afternoon, the Mayor of Burton-on-Trent (Mr. T. Metcalfe) laid the foundation stone of the new museum and art gallery, which will also contain show-rooms for gas and electric light appliances; and it is expected that the building will be finished in the autumn of next year. The show-rooms, which will cost about £3000, will be on the ground floor; and in connection with them there will be an electricity sub-station and accommodation for gas-compressing plant. The Chairman of the Gas and Electricity Committee (Alderman Lowe), in opening the proceedings, said the Committee were of opinion that it was not only in the interest of the Corporation, but also in that of the public that, as far as possible, they should have complete show-rooms where they could exhibit all the most up-to-date and efficient fittings obtainable on the market. He was glad to be able to state that, after considerable negotiations, they arrived at an understanding which would be to the mutual advantage of the Corporation and the tradesmen. Fittings would be exhibited in the show-rooms, and people would be able to go to the respective shops in the town and purchase what they required. The Architect (Mr. Henry Beck), on behalf of the builders (Messrs. R. Kershaw and Sons) and himself, presented the Mayor with a silver trowel as a memento of the occasion; and his Worship, in accepting it, said it would bring to him very happy memories. He then performed the ceremony of laying the stone. The company subsequently assembled in the Education Offices, where the toast of "The Health of Alderman Lowe," proposed by the Mayor, was cordially honoured. His Worship mentioned that it was largely owing to the Alderman's energy and foresight, and to the interest he took in the prosperous gas undertaking, that they had been able to promote so important a scheme as that upon which they were engaged. Alderman Lowe, in response, said his work in connection with the matter had been one of the most pleasurable description. He could only say he was very thankful to hear the Mayor remark, "Yes, it can be done," and that the Gas Committee had the funds at their disposal.

Sheffield Fuel, Light, and Power Exhibition.—The report as to the above exhibition, which appeared in last week's "JOURNAL," inadvertently omitted to mention that Messrs. Alex. Wright and Co., Limited, of Westminster, show an extensive selection of their specialities—including water-meters on the Yorke-Weir system, CO_2 recorders, pressure and vacuum indicators, fuel calorimeters, thermometers, and gas-analysis apparatus.

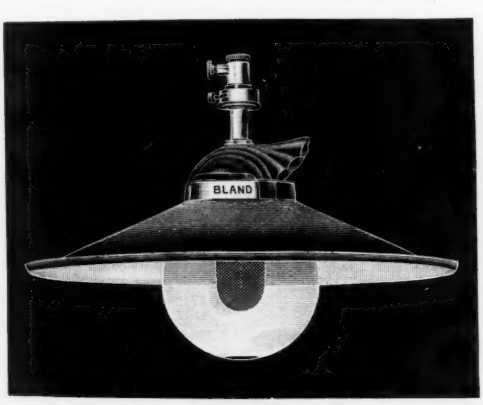
Lighting of Whitehead.—At a recent meeting, the ratepayers of Whitehead (co. Antrim) decided to present a memorial to the Larne Rural District Council, asking that a scheme of compulsory public lighting should be introduced in the town, which is situated on Belfast Lough, and is a favourite residential quarter. It was stated that there would be no difficulty in regard to such a scheme, which would involve a special rate of 1½d. in the pound.

The BLAND LIGHT SYNDICATE, Ltd.,

63, QUEEN VICTORIA STREET, LONDON, E.C.
(4 Doors from the Mansion House Station).
2, CARR STREET, BLACKFRIARS & DEANSGATE, MANCHESTER.

The "Bland" Factory, Mill, Shop, and Workshop Burners.

As shown at The National Gas Exhibition.



"C" No. 7.

The "Bland" Factory Burner is so constructed as not to afford any places for lodgment of dust, dirt, fluff or similar material.

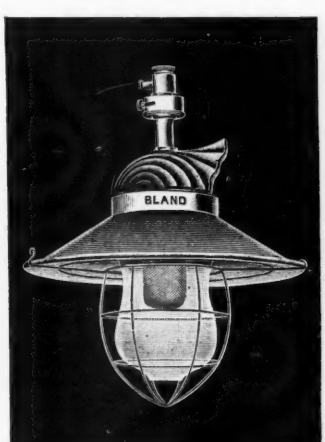


Illustration showing Wire Guard, "Pear" Globe and 8 in. Shade.

Complete with 8 in. Enamelled Iron Reflector, Globe (Round or "Pear") and Mantle.
Price 6s. 9d.

Complete with 12 in. Enamelled Iron Reflector, Globe (Round or "Pear") and Mantle.
Price 7s. 3d.

Price of Round Globe with Bayonet Fixing.
Clear .. .. 18s. 6d. doz.
Obscured .. .. 19s. 0d. doz.

Wire Guards 10d. each.
For Round or "Pear" shaped Globes.

These Burners can also be fitted with "Pear" Globes with HOLES AT THE SIDE—no hole at bottom.

All Burners fitted with "MONOPEL" Heat Resisting Glass.

Smethwick Gas Employees' Holidays and Pay.

At the meeting of the Smethwick Town Council last Tuesday, the Gas Committee reported that they had received a deputation of the men employed at the gas-works, accompanied by Mr. Simpson, the General Secretary of the Gas Workers' Union, on the question of their memorial with reference to annual holidays. They decided that, from and after April 1, 1914, six days' holiday, with pay, should be allowed annually to all men who have been in the employ of the Corporation not less than twelve months. The Committee also received a deputation from the gas-fitters, accompanied by Mr. Sabin, the Secretary of the Gas-Fitters' Trade Association, with reference to an application on behalf of three of the gas-fitters for a special advance of wages of ½d. per hour beyond the standard rate of 8½d. fixed in October last year, after consultation with a similar deputation. Having heard the explanation of the Committee, Mr. Sabin expressed himself as unable to carry the application any further; and the interview terminated by the Committee promising to forward their decision. After giving the matter full consideration, the Committee regretted they were unable to see their way to granting the application.

Failure of an Incandescent Burner Dealer.

At the London Bankruptcy Court on Wednesday last, before Mr. W. P. Bowyer, Official Receiver, the first meeting of creditors was held under the failure of Mr. Harry Maisner, trading, under the style of H. Maisner and Co, at No. 45B, Jewin Street, E.C., as an importer and exporter of incandescent mantles. The debtor was for some years Managing-Director of the Star Inverted Burner Company, Limited; but he sold his interest in the concern, and the Company was wound-up. After this he carried on the business of a manufacturer's agent at No. 14, Thavies Inn, Holborn, until May, 1912, when he gave it up and commenced as a merchant at the Jewin Street address. The business had not paid so far; but he hoped eventually to make it a success. Early in August last, owing to the receipt by several of his creditors of anonymous letters alleging that he was a "long firm," and that he was selling goods below cost price, his creditors began to press him, and he was advised to call them together. A meeting was held, and a statement of affairs presented showing liabilities amounting to £9000 and assets estimated at £14,000. Debtor offered to pay his creditors in full if they would give him time. Nearly all of them agreed to do so, but two or three declined. He reckoned that his interest in the Queen and City Mansions, Caledonian Road, was worth £10,000; and he did not consider himself to be insolvent. He attributed his position to the anonymous letters referred to. The result of the meeting was the appointment of Mr. G. Carfield (of Messrs. Carfield and Cripwell) as Trustee of the estate, with a Committee of Inspection consisting of five of the largest creditors. The Official Receiver said he did not think the debtor's estimate of his assets would be realized.

Cheap Gas as an Election Cry.

Throughout the whole of his strenuous election campaign in Manchester during the past week, Councillor W. Kay, J P., the energetic and enthusiastic Chairman of the Manchester Corporation Gas Committee, has kept persistently to the forefront the question of the allocation of gas profits. At meeting after meeting of the ratepayers, he endeavoured to remove the impression which many people had that the Gas Committee were responsible for the appropriation of so large a sum every year for the reduction of the rates. As he pointed out in his speech at Southport last Wednesday, noticed in another column, so long as nine years ago his predecessor, the late Alderman Gibson, was the means of having a Special Committee appointed to consider the matter; but nothing ever came of it. The Committee of which he was Chairman approved the idea that "the one and only way was to reduce the price of gas as much as possible, so that it should be cheaper than coal." His election on Saturday by a majority of upwards of 1000—he polled four votes to his opponent's one—should therefore be taken as an index that, so far as Manchester is concerned, no effort will be spared to place on a proper basis the vexed question of the allocation of gas profits.

Dawlish Water-Supply Award.—The Dawlish Urban District Council have received the award of Mr. Ernest Page, K.C., the Arbitrator appointed to determine the price to be paid for land to be used in connection with the water supply of the town. The owner of the property is Sir Robert Newman; and the inquiry was recently held in London. The amount of land wanted is 307 acres; and the price asked for it was £28,361. The Council had offered £2700. The Arbitrator has put the figure at £5070.

Cork City Water Supply.—The Public Health Committee of the Cork Corporation have requested the City Engineer to report to the Water Committee on what the members regard as the serious nature of a report submitted by the City Analyst (Mr. D. J. O'Mahoney) on samples of water taken from the city mains. The Analyst stated that the water supplied for domestic purposes could only be ranked as "low among second-class waters;" and he suggested that the reservoirs should be cleaned. Samples were taken from high-level and low-level reservoirs both before and after filtration, and in each instance the result was unsatisfactory. The supply, after passing through the filtering tunnel, had somewhat improved; but it apparently became deteriorated in its temporary storage in the reservoirs. Alderman J. J. Kelliher, who presided, said the disclosures of the Analyst were very strange indeed, for it would seem that better water was being supplied to the city when it was unfiltered. Mr. J. F. O'Sullivan said he was anxious to know whether all the water sent into the city was filtered. The City Engineer said he had the word of the Resident Engineer, on which he absolutely relied, that it was. It was quite another thing, however, whether or not the filters were doing their work properly.

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THE DISTINCTIVE POINTS:

SPECIAL FENDER entirely encasing all brasswork.
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GRACEFUL DESIGNS.

10-in. and 13-in. FIRE OPENINGS.

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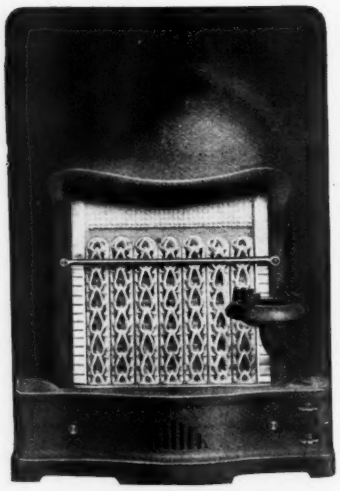

THE "EDMUND."
Fitted with Removable Side Boiling Burner.

Proposed Extension of the Ellesmere Port Gas-Works.—At the last meeting of the Ellesmere Port Urban District Council, it was reported that the Gas-Works Sub-Committee had considered the question of the provision of new gas-works; and it was explained that it would be necessary to provide plant capable of producing about 50 million cubic feet of gas per 24 hours, at an estimated cost of £15,000. Mr. William Newbigging was appointed Consulting Gas Engineer to the Council.

Ruthin Water Supply.—Dr. Thomas Roberts, Medical Officer of Health for Denbighshire, in a report on the water supply of Ruthin, summarized the results of his inspection on the 19th ult. as follows:—(1) The supply is liable to serious pollution at its source; (2) the storage capacity of the reservoir is quite inadequate; (3) the filter-bed is inefficient; (4) the water-mains are corroded. The report concluded with a suggestion in favour of municipalizing the undertaking. The Analyst (Mr. W. T. Lowe, of Chester) stated that the condition of the water was very unsatisfactory. Acting upon instructions from the Water Company, Mr. E. W. Dixon, of Leeds, prepared a special report, which has been submitted to the Town Council. In this he states that a supply from this source should be of a high-class quality; there being very little possibility of contamination by drainage, either from houses or land. In regard to the alleged deficiency, Mr. Dixon states that the shortage of water during the past summer was undoubtedly due to extravagant and quite unnecessary waste—viz., 115,000 gallons per day, instead of about 70,000 or 75,000 gallons, which was an unheard-of consumption for such a town. He is of opinion that if the daily requirements are brought within proper control, and the existing supply protected in the ways he suggests, the Town Council would enjoy a water supply of first-class quality, and ample, with the existing storage, for all reasonable demands. He found no reason for the suggestion of Dr. Roberts that the supply should be under municipal control.

Gas v. Electricity for Infirmary Lighting.—The Selas Lighting Company, of Manchester, intimated to the Ballymena Board of Guardians that they were prepared to instal in the new infirmary a trial plant on their system of lighting at a cost of £367 8s. 6d., or at £100 extra in case a switch system were preferred. Mr. A. Docking, the Company's representative, was in attendance. The Board's Engineer (Mr. Brown) expressed a preference for electric lighting; but, after discussion, the Guardians decided to postpone a motion in favour of a report recommending electricity.

APPLICATIONS FOR LETTERS PATENT.

23,680.—Lines, A. A., and Mellor, P. H., "Radiants for gas-fires." Oct. 20.

23,685.—Wolski, F. R. de, "Bunsen burners." Oct. 20.

23,702.—Marks, E. C. R., "Double-walled cooking-oven." A communication from the Siemens-Schuckertwerke G.m.b.H. Oct. 20.

23,713.—Lehmann, W., and Jacques Kellermann G.m.b.H., "Pyrophorus gas-lighter." Oct. 20.

23,832.—Bellamy, A. R., "Gas-engines." Oct. 21.

23,834.—Fox, L. M., "Acetylene generators." Oct. 21.

23,854.—Sand, H. J. S., and Reynolds, F., "Gas-tight seals." Oct. 21.

23,912.—Napper, S., "Cocks and valves." Oct. 22.

23,913.—Marillier, F. W., and Wilson, C. S., "Valves for high-pressure gas." Oct. 22.

24,091.—Hutchinson, B. G., "Dry meters." Oct. 24.

24,234.—Oswald, W. von, "Continuous retorts." Oct. 25.

24,237.—Ross, H. C., "Treating tar." Oct. 25.

24,257.—Rosenbluth, E. M'M., "Acetylene gas protectors." Oct. 25.

GAS COMPANIES' STOCK AND SHARE LIST.

Business on the Stock Exchange last week had two faces—Janus-like, sharply opposed to each other back-to-back. The earlier part of the week had a cheerful countenance, markets showed strength, and prices came up smiling. Then succeeded a quick *volte-face;* markets wore a look of depression; and the gains in most departments melted away. The chief adverse factors to which the relapse was attributable were the Mexican difficulty abroad and apprehension regarding labour questions at home. Business was at no time fairly active; the settlement of the final October account engaging attention. The opening day was quiet; but its tone was pretty good under favouring influences. The reduction in the German Bank-rate, some good railway traffics, a stronger tendency in foreign bourses, and closing of "bear" accounts, were gratefully welcomed. Consols advanced ⅛, and Rails hardened. Tuesday was quite a cheerful day; markets in general showing an access of strength, and some of them to a marked degree. Government issues and other gilt-edged commodities were very strong, and Consols rose ¼ for money and ⅜ for account. Rails caught the favouring breeze, and made some nice advances. Transatlantics, after some varying moods, closed firm. Wednesday brought quite a change of tone; depression succeeding the fair promise of the day before. It seemed mostly to proceed from heavy selling abroad, which first affected some of the more susceptible markets and then spread its influence all around. Government issues were not much hit, but Consols dropped ⅛ for the account. Rails fell, more than there seemed any call for; and Transatlantics had a considerable drop, but rallied to something better than the worst of the day. Foreign were weak. Thursday was not a good day, though gilt-edged were steady. Rails weakened on fears of labour trouble. American zig-zagged hither and thither, and closed quite ragged. On Friday, markets were still on an ebb tide, liquidation in Transatlantics proceeding, which depressed other quarters in spite of some account-closing. Most departments gave way, but Consols closed unchanged at 72⅜ to 73—a rise of ⅜ in the week. The Exchange was closed on Saturday. The Money Market was very firm, and all rates tightened. Business in the Gas Market was very moderate, even allowing for the working week being a day short. But the tone was quite satisfactory and firm; and some quotations advanced. In Gaslight and Coke issues, the ordinary was not active, but was stronger; transactions ranging from 101 to 102—a rise of ½. In the secured issues, the maximum made 75¾ and 76, the preference 93 to 95, and the debenture 72¾ to 73½. South Metropolitan was quiet and steady at 108 to 109; and the debenture marked 73⅞. In Commercials, the 3½ per cent. changed hands at 104, and the debenture at 72 and 72½. Among the Suburban and Provincial group, Alliance and Dublin realized 59⅜ to 61, Bournemouth "B" 14⅞ and 15, ditto preference 13⅝, Brighton "A" 151½, British 44⅞, South Suburban 116½, Tottenham "B" 115¼ and 115¾, and Chester 110. In the Continental companies, Imperial marked 164½ to 166½, Union 80½, and European 17½ and 17 9/16. Among the undertakings of the remoter world, Hongkong fetched 17 and 17½, Melbourne 96¼ and 96¾, Oriental a little lot free at 124, and Primitiva preference 4⅞ and 5.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
1,551,868	Stk.	Oct. 15	4	Alliance & Dublin Ord.	58—63	..	6 7 0
374,000	,,	July 11	4	Do. 4 p.c. Deb.	80—83	..	4 16 5
280,000	5	Oct. 15	7½	Bombay, Ltd.	6¼—6¾	..	5 17 8
50,000	10	Aug. 28	15	Bourne- mouth Gas and Water	10 p.c.	28¼—29½	..	5 2 2
					B 7 p.c.	14½—15½	..	4 11 10
					Pref. 6 p.c.	13¼—13¾	..	4 7 3
347,500	10	,,	7					
75,000	10	,,	6					
380,000	Stk.	Aug. 14	14	Brentford Consolidated	262—267	.	5 4 10
330,000	,,	,,	11	Do. New	201—206	+3	5 6 10
50,000	,,	,,	5	Do. 5 p.c. Pref.	111—113	..	4 8 6
206,250	,,	June 13	4	Do. 4 p.c. Deb.	94—96	..	4 3 4
217,380	Stk.	Aug. 28	11	Brighton & Hove Orig.	201—206	..	5 6 10
244,200	,,	,,	8	Do. A Ord. Stk.	149—152	+1	5 5 3
530,000	20	Sept. 26	12½	British	44¼—45½	..	5 9 11
120,000	Stk.	June 27	4	Do. 4 p.c. Deb. Stk.	87—89	..	4 9 11
245,771	Stk.	,,	4	Buenos Ayres 4 p.c. Deb.	89½—91½	..	4 7 5
100,000	10	—	—	Cape Town & Dis., Ltd.	2—3	..	—
100,000	10	—	—	Do. 4½ p.c. Pref.	3—5	..	—
100,000	Stk.	June 27	4½	Do. 4½ p.c. Deb. Stk.	75—80	..	5 12 6
157,150	Stk.	Aug. 14	5	Chester 5 p.c. Ord.	109—111	+1½	4 10 1
1,513,280	Stk.	Aug. 28	5/9/4	Commercial 4 p.c. Stk.	105—107	..	5 2 1
660,000	,,	,,	5½	Do. 3½ p.c. do.	102—104	..	5 2 6
475,000	,,	June 13	8	Do. 3 p.c. Deb. Stk.	71½—73½	..	4 1 8
800,000	Stk.	,,	4	Continental Union, Ltd.	79—82	..	4 17 7
200,000	,,	,,	7	Do. 7 p.c. Pref.	124—126	..	5 11 1
492,270	Stk.	—	5	Derby Con. Stk.	123—124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	102—104	..	3 16 11
1,002,180	10	July 30	10	European, Ltd.	17½—18¾	..	5 8 1
16,386,660	Stk.	Aug. 14	4/17/4	Gas-light and Coke	4 p.c. Ord.	100½—102½	+½	4 15 0
2,600,000	,,	,,	3½		3½ p.c. max.	74—77	..	4 10 11
4,062,235	,,	,,	4		4 p.c. Con. Pref.	93—96	..	4 3 4
4,674,850	,,	June 13	3	Coke and	3 p.c. Con. Deb.	71—74	..	4 1 1
258,740	Stk.	Sept. 11	5	Hastings & St. L. 3½ p.c.		87—89	..	5 12 4
82,500	,,	,,	6½	Do. do. 5 p.c.		—	..	—
70,000	10	Oct. 15	11	Hongkong & China, Ltd.		16⅞—17⅛	..	6 7 6
131,000	Stk.	Sept. 11	7⅝	Ilford A and C		150—153	..	4 19 8
65,780	,,	,,	6½	Do. B		118—120	..	5 2 1
65,500	,,	June 27	4	Do. 4 p.c. Deb.		89—91	..	4 7 11
4,940,000	Stk.	May 16	9	Imperial Continental		163—168	..	5 7 2
1,235,000	Stk.	Aug. 14	3½	Do. 3½ p.c. Deb. Red.		83½—85½	..	4 1 10
200,242	Stk.	Aug. 28	6½	Lea Bridge Ord. 5 p.c.		118—121	..	5 3 4
561,000	Stk.	,,	10	Liverpool United A		206—208	..	4 16 2
718,100	,,	,,	7	Do. B		147—149	−1	4 19 0
306,083	,,	June 27	4	Do. Deb. Stk.		94—96	..	4 3 4
68,480	Stk.	June 27	3	Maidstone 3 p.c. Deb.		66½—68½	..	4 7 7

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
75,000	5	June 13	6	Malta & Mediterranean	4⅜—4⅝	..	6 3 1
250,000	100	Oct. 1	4½	Met. of Melbourne 4½ p.c. Deb.	96—98	..	4 11 10
541,920	20	May 30	4	Monte Video, Ltd.	12—12½	..	6 8 0
1,775,892	Stk.	July 20	4½	Newc'tle&G'tesh'd Con.	99½—100	..	4 10 0
529,705	Stk.	June 27	3½	Do. 3½ p.c. Deb.	83½—84½	..	4 2 10
55,940	10	Aug. 28	7/10/6	North Middlesex 7 p.c.	12½—13½	..	5 11 5
300,000	Stk.	May 16	8	Oriental, Ltd.	124—129	..	6 4 0
60,000	5	Sept. 26	10	Ottoman, Ltd.	8—8½	..	5 17 8
60,000	50	Aug. 14	13	Portsea, Island B	122—125	..	5 6 1
100,000	50	,,	12	Do. C	119—122	..	4 18 4
249,980	5	Oct. 15	8	Primitiva Ord.	5⅞—6⅛	..	6 5 6
499,960	5	June 27	5	,, 5 p.c. Pref.	4¼—5⅛	..	4 17 7
521,600	100	June 2	4	,, 4 p.c. Deb.	93—95	..	4 4 3
346,198	Stk.	June 27	4	River Plate 4 p.c. Deb.	89—91	..	4 7 11
275,000	5	Sept. 26	12	San Paulo, Ltd.	—	..	—
150,000	10	,,	6	Do. 6 p.c. Pref.	11—11½	..	5 4 4
125,000	50	July 1	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Aug. 28	10	Sheffield A	222—224	..	4 9 3
209,984	,,	,,	10	Do. B	222—224	..	4 9 3
623,500	,,	,,	10	Do. C	220—223	..	4 9 8
90,000	10	Oct. 15	7½	South African	9½—10½	..	7 2 10
6,429,895	Stk.	Aug. 14	5/9/4	South Met., 4 p.c. Ord.	108—110	..	4 19 4
1,895,445	,,	July 11	3	Do. 3 p.c. Deb.	73—75	..	4 0 0
209,820	Stk.	Aug. 14	8½	South Shields Con. Stk.	157—159	..	5 6 11
952,795	Stk.	,,	6	S'th Suburb'n Ord. 5 p.c.	115—117	..	5 2 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	113—115	..	4 6 11
117,058	,,	June 27	5	Do. 5 p.c. Deb. Stk.	115—117	..	4 5 6
594,740	Stk.	May 16	5	Southampton Ord.	102—105	..	4 15 3
120,000	Stk.	Aug. 14	7⅜	Tottenham A 5 p.c. and B 3½ p.c.		136—139	..	5 6 1
543,940	,,	,,	5⅝			114—116	..	5 1 3
149,470	,,	June 27	4	Edmonton 4 p.c. Deb.		90—92	..	4 7 0
182,380	10	,,	5	Tuscan, Ltd.		5—6	..	8 6 8
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.		96—98	..	5 2 0
236,476	Stk.	Aug. 14	5	Tynemouth, 5 p.c. max.		111—113	..	4 8 6
				Wandsworth, Wimbledon, and Epsom—				
30,000	Stk.	Aug. 28	8⅜	Wandsworth A 5 p.c.		155—160	..	5 4 8
255,636	,,	,,	6⅞	,, B 3½ p.c.		130—135	..	5 1 10
108,075	,,	,,	5/17/3	,, C 3½ p.c.		110—115	..	5 2 0
352,000	,,	,,	6½	Wimbledon 5 p.c.		111—116	..	5 5 7
98,000	,,	,,	6⅝	Epsom 5 p.c.		115—120	..	5 10 5
88,416	,,	June 27	3	3 p.c. Deb. Stk.		68—70	..	4 5 9

Gas-Workers and Municipal Politics—An interesting departure in connection with the municipal elections at Plymouth was made by the men in the employ of the Plymouth and Stonehouse Gas Company last week. Meeting at the gas-works on Thursday evening, they unanimously passed the following resolution: "That this mass meeting of gas workers, realizing that the low price of gas is a great advantage to the town, and that the interests of the Company's workmen and the ratepayers are prejudiced by the unfair competition of the Electricity Committee in substituting electric lighting for gas in the streets without enabling the pubic to compare it with modern gas-lamps, resolves to appoint a deputation to call upon the municipal candidates to ask them, when elected, to use their efforts to secure fair play." The deputation duly waited upon the candidates next day, and succeeded in enlightening several of them on aspects of municipal trading to which their attention had not been directed. Owing to the fact that the public meetings in connection with the municipal elections are of rare occurrence, no opportunity is afforded of the public discussion of such subjects, and the gas workers' only course was that which they adopted. The subject of the public lighting is just now of interest in Plymouth, because the Town Council have sanctioned certain experiments with improved arc lighting in the principal streets while persistently ignoring proposals of the Gas Company that tests should be made of the efficiency of gas lighting on modern lines.

The Directors of Meters Limited have declared interim dividends to the 30th of September last at the rate of 5½ per cent. per annum on the preference shares, and at the rate of 4 per cent. per annum on the ordinary shares.

At the meeting of the Bacup Town Council last Thursday, it was resolved that a sum of £1400 should be paid to Mr. James Diggle, Assoc.M.Inst.C.E., in full settlement of all his claims against the Corporation in relation to his position as Consulting Water Engineer.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

GAS ENGINEER AND MANAGER. Hereford Corporation. Application by Nov. 13.
DRAUGHTSMAN. West's Gas Improvement Company, Manchester.
RENTAL CLERK AND BOOK-KEEPER. No. 5809.
TRAVELLER. No. 5807.
CONDUCT OF LONDON OFFICE. No. 5806.
FOREMAN. Winchester Water and Gas Company.
CANVASSER AND ADVISER. Worthing Gas Company. Applications by Nov. 17.
YARD FOREMAN. Brighouse Gas-Works.
MECHANIC. No. 5808.
MAIN AND SERVICE LAYER. Ormskirk Gas-Works.
JUNIOR CLERK. G. J. M., 112, Grosvenor Road, London, S.W.

Appointments, &c., Wanted.

GAS AND WATER ENGINEER (German, without remuneration). A. Strauss-Collin, Bush Lane House, Cannon Street, E.C.

Agency Wanted.

GAS METERS. No. 5810.

Plant, &c. (Second Hand), for Sale.

RETORTS AND MOUTHPIECES. Newcastle-on-Tyne Gas Company.
STATION METERS AND GOVERNORS. No. 5801.

Plant, &c. (Second Hand), Wanted.

TEST ROOM GASHOLDER. No. 5805.

Stocks and Shares, Sales of.

ALDERSHOT GAS, &c., COMPANY. London Mar Nov. 18.
BISHOP'S STORTFORD HARLOW AND EPPING GAS AND ELECTRICITY COMPANY. Chequers Hotel, Bishop's Stortford. Nov. 11.
BOGNOR WATER COMPANY. London Mart. Nov. 18.
BOURNEMOUTH GAS AND WATER COMPANY. By Tender. Nov. 6.
BRIXHAM GAS COMPANY. Town Hall, Brixham. Nov. 13.
PINNER GAS COMPANY. London Mart. Nov. 18.
TITCHFIELD GAS COMPANY. London Mart. Nov. 18.
WANDSWORTH &c., GAS COMPANY. London Mart. Nov. 25.

TENDERS FOR

Coke.

MIDDLETON GAS DEPARTMENT. Tenders by Nov. 12.

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